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THE TURKS IN INDIA

CRITICAL CHAPTERS ON THE ADMINISTRATION OF THAT COUNTRY BY THE CHUGHTAI, BÁBAR, AND HIS DESCENDANTS

BY

HENRY GEORGE KEENE M.R.A.S.

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AND

AUTHOR OF "THE MOGHUL EMPIRE"

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* Figs. 32–50, also 55, 59, 63–69, are fine original drawings from nature by Colonel Boyd, Bombay Staff Corps, made specially for this work.

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NOTE.

This Work has not had the advantage of a revision by its Author whilst passing through the press. Mr. Keene is at his post in India. It has not, therefore, been possible to consult his wishes in the matter of transliteration, nor could they be always gathered from the MS., which in parts had been transcribed by an amanuensis. In fairly familiar words, where no doubt as to pronunciation could arise, popular spelling has been adopted, and diacritical points have been omitted.

Mr. Keene has wished the following intimation to be made:—

"It is not necessary to give a list of all the authorities that have been consulted in this Work. Besides original records and books in the Persian, French, English, and Spanish languages, continuous and invaluable aid has been derived from the 'History of India,' by Elliot and Dowson. This Work, in eight volumes, contains copious translated extracts from all the best historians of Mohamadan India, many of which are now accessible for the first time. It may, indeed, be truly said that its completion puts the subject upon an entirely new basis, and forms the best justification for the publication of the present chapters. The constant sympathy and aid of the late Principal Blochmann, M.A., of the Calcutta Madrisa, demand warm acknowledgment. His death has caused a blank in the ranks of Oriental scholarship that will not soon be filled."

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INTRODUCTORY.

MEDICAL RELATIONS WITH THE LAW COURTS.

"*As a hunter tracks a wounded beast to its lair by its drops of blood, so let a King track [crime] to justice by close-searched proofs.*"—MANU'S LAW CODE (about 100 B.C.).

MEDICAL Jurisprudence may be defined as the science which teaches us how to discover and apply medical and cognate scientific facts for the ends of Law and Justice, in unravelling Crime and protecting Individuals, Society and the State. It is an application of Medical Knowledge from a very different standpoint from Medicine proper; and represents all the difference between seeing by the eye of the Law, instead of by the eye of the Healing Art. Thus a wound which the surgeon is concerned only to so examine and treat as to heal it as quickly as possible, requires the medical jurist to note: 'Is it dangerous to life'? 'How and with what weapon was it inflicted'? 'Was it accidental, self-inflicted, suicidal or homicidal'? 'Was it inflicted before or after death'? etc., etc., etc. And in a case of cut-throat, whilst his first object is to save the patient's life, he requires to note many necessary details for the law-courts.

The early use of medical knowledge for legal purposes can be traced in the ancient codes. Manu forbade corporal punishment of a pregnant woman; the Mosaic Law, which is now found to have been borrowed by the Jews from the Babylonian Code of Khammurabi (2123–2081 B.C.) and previous Aryan lawgivers, required the priests to adduce medical evidence in wounds, leprosy, etc.; the Greek forensics, such as Galen, discussed questions of legitimacy, simulated diseases, the differences between the lungs of the live-born and the fœtus; and for India there are similar references in the later *Vedas*, in Manu's code and the *Purānas*. In Vedic literature (*circa*

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650–100 B.C.) abortion or 'the slaying of an embryo' (*bhrūna-hatyā*) was a specified crime.[1]

It was not, however, until the 16th century A.D. that a definite status was accorded to medical evidence in European courts of law. The penal code of George, Bishop of Bamberg in Germany, drawn up in 1507, is considered the first effort in this direction, and a quarter of a century later this was enlarged and extended to the German empire by the Diet of the neighbouring town of Ratisbon. In 1553, Charles V. promulgated the code bearing his name—*Constitutio Criminalis Carolina*—which has been called "the dawn of legal medicine." In it the magistrate is directed to obtain the opinion of medical men in criminal trials where death was alleged to have occurred from criminal causes.

This new department of study was known as *State Medicine* in Germany, and as *Legal Medicine* in France, and when it was latterly introduced into Great Britain it was called *Medical Jurisprudence*, or *Forensic*[2] *Medicine*. The first systematic treatise on the subject in English appeared in 1787, in Dr. Parr's "Elements of Medical Jurisprudence," and in 1801 the first chair for the teaching of the subject was established in Britain, that of Dr. Duncan at Edinburgh.

Whilst the edifice of the new study was reared on the European continent, largely by the systematic labours of Orfila the Spaniard, of Tardieu in Paris, and of Casper in Berlin, before the year 1850 the classics of Christison of Edinburgh, and Taylor and Guy of London had redeemed the reputation of the British school, and soon thereafter India possessed Norman Chevers' pioneer manual. At the present day the importance of this subject is so well recognized that its study forms an essential part of the medical course of every university and licensing body in the United Kingdom. So also is it in India, for expert medical testimony, important in every country, is especially so in the East, where it is often the only trustworthy evidence on which hangs the liberty or the life of a human being.

In this way, the Law, in the interests of good government, often required medical men to assist it in laying bare the evidence of many kinds of crime and offences against the person and civil rights of individuals and the community at large, such as assault, murder, poisoning, rape, legitimacy, inheritance, divorce, insanity, fraudulent impersonation, questions of damages for injuries, life assurance, etc. Thus the medical

[1] *Vedic Index*, Macdonell and Keith, 1912, I. 391.

[2] 'Forensic' is derived from the Latin *forum*, the market-place, because the Romans, whose law code still remains to-day the basis of our own, held their court of justice there.

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practitioner is liable to be called on at any time to give evidence as a medical jurist in the witness-box, in cases of more or less public interest or notoriety, so it behoves him even for his own reputation that he should learn to look from the medico-legal standpoint upon all his cases which are likely to become the subject of judicial inquiry; and that he should carefully note down at the time everything likely to be of medico-legal importance.

It is also desirable that he should know something of the legal nature of evidence and the procedure in courts of law; and in the case of the medical jurist in India, the procedure in Indian law courts in particular, some of the peculiarities of crime in India, the circumstances under which the more common crimes come to be perpetrated, and the devices ordinarily taken to conceal crime in this country.

Criminal Procedure and Medical Evidence in India.

The present law of India is based upon English and Roman law modified to suit the varying customs and religious beliefs of the Hindu, Mohammedan, and other different nationalities which make up the great Indian continent.

The preliminary inquiry into offences against the person and into sudden and unnatural deaths in India is made by a police-officer,[1] who is authorized in fatal cases to forward the dead body for examination to the nearest civil surgeon or other qualified medical man appointed by the Local Government to conduct such examinations, except in Calcutta and in Bombay city, where the coroner makes an inquest and arranges for the *post-mortem* examination. District, sub-divisional, and other magistrates specially empowered by the Local Government or by the district magistrate, may also hold inquests and order the exhumation of a body for examination.[2]

The medical officer's report is sent to the magistrate of the district (or his sub-divisional magistrate), who, in cases where a reasonable suspicion is established against an accused person in the case, may require the presence of the reporting medical officer to give a deposition at his court in presence of the accused and be cross-examined if necessary. For the medical report cannot be admitted as evidence until it has been deposed to and recorded *de novo* by the magistrate in presence of accused.

[1] *Criminal Procedure Code*, s. 174 (1). In Bombay and Madras Presidencies the inquiry into unnatural deaths may be made by the village headman (s. 174 (4)).

[2] *Cr. P. C. ss.* 174 (5), 176.

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At this magistrate's court the medical officer should give his evidence with as much care as he would do in the High Court, for his evidence is recorded, and the case may go to the higher court however trivial it may seem, in which case the opposing counsel with the evidence in the lower court laid before him and with weeks to pick holes in any loose expressions that he may have used, and prompted by a clever medical man at his elbow, may bring the medical evidence into discredit. On the other hand, if the medical report does not substantiate the charge, the case is not usually proceeded with further; for the medical officer exercises practically the judicial function of a 'Court of First Instance' in assault cases.

Should it prove to be one of the more grave offences, such as murder, causing miscarriage, rape, etc., which are triable only by Courts of Session or High Courts, the district magistrate (or his sub-divisional magistrate) after recording the evidence commits the accused for trial to the higher court. Thus the medical man who conducted the original examination may be required to appear before more than one court in connection with the same case should the magistrate deem it necessary.[1]

The several **criminal courts** are: (*a*) High Courts; (*b*) Courts of Session; (*c*) Magistrates of the 1st class and Presidency Magistrates of the 2nd and 3rd class.

The **powers** of these courts are:—The High Courts and Courts of Session are empowered to try any offence and to pass any sentence authorized by law; but a sentence of death passed by a Court of Session shall be subject to confirmation by the High Court (*s.* 31). Courts of presidency magistrates and of magistrates of the first class may not try certain grave offences, *e.g.* murder, causing miscarriage, rape, and unnatural offences, and may not, for any single offence, sentence to more than two years' imprisonment and 1000 rupees fine. Magistrates of the second class may not try any offence punishable with three years' imprisonment (*s.* 29), and may not, for any single offence, sentence to more than six months' imprisonment and 200 rupees fine. Magistrates of the third class may not try an offence punishable with one year's imprisonment, and may not, for any single offence, sentence to imprisonment for more than one month and 50 rupees fine. Third class magistrates may not sentence to solitary confinement or to whipping, and second-class

[1] *Cr. P. C.*, *s.* 509 (1), states that if the civil surgeon's evidence is taken before the committing magistrate, and *attested* by him, that is to say, the committing magistrate must state below the civil surgeon's deposition that it was taken in presence of accused, and explained to him, and that he had an opportunity of cross-examination, the higher court may accept it as evidence without calling the civil surgeon. Clause 2, however, empowers the higher court to call him, but this is not usually done with provincial cases, unless the committing magistrate had omitted some important point. So where the attendance of a medical witness cannot be obtained, and his evidence is taken on commission under Chap. XL. of the *Cr. P. C.*, his depositions can be used at the trial (*s.* 509).

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magistrates may only sentence to whipping, if specially empowered by the Local Government (*s.* 32).

A Jury is required in every criminal trial before a High Court. Juries are of two kinds, **Special** and **Common.** A special jury is composed of persons taken from a special list of about two hundred. In every case where the offence to be tried is punishable with death, and also in such other cases as a judge of the High Court may direct, the trial is to be before a special jury (*s.* 276). In all other cases the trial takes place before a common jury, *i.e.* composed of persons whose names appear in the general list of persons liable to serve as jurors.

Trials before a **Court of Session** are ordinarily conducted with the aid of assessors, two or more in number, but the Local Government can, by order in the official *Gazette*, direct trials before any Court of Session of all offences or any particular class of offences to be by jury. Section 320 of the Code enumerates the persons exempt from liability to serve as jurors or assessors, and clause (*h*) of this section includes among those exempted "surgeons and others who openly and constantly practise the medical profession."

When an accused person appears to be "of unsound mind, and consequently incapable of making his defence," the magistrate shall first inquire into or try the fact of such unsoundness of mind, and if this be proved the trial shall be postponed and the magistrates shall cause the accused to be examined by the civil surgeon, or such other medical officer as the Local Government directs.

Coroner's Court.—This is a preliminary court of inquiry, into the cause of all accidental and sudden deaths, where there is any suspicion of foul play. In India the Coroner is restricted to the presidency towns, for the provinces the district and other magistrates are ex-officio coroners, although seldom performing the duties, the inquiry being conducted by the police in correspondence with the civil surgeon; see above. The coroner views the body at his inquest with a jury. At this court no accused need be present as no one is being tried, unlike a magistrate's court which is a court of inquiry, not into the mere cause of death, but into the culpability of a person accused of some specific criminal act or negligence [1] of a criminal kind, and where the accused must be present, and where witnesses may be cross-examined, and the simple cases be dealt with summarily.

At the coroner's court, however, any 'suspected person' must be present if possible, and has the right of producing witnesses, cross-examining himself or by counsel, and of making any defence or statement he desires. When a suspected person is ill the inquest is adjourned till he is able to attend. The coroner's court also inquires into the culpability of a person

[1] Offence by 'illegal omission' (*Penal Code*, s. 32), *e.g.* a woman may be committed for murder by intentionally omitting to tie the cord, or to supply her infant with food (see chapter on 'Infanticide').

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suspected, and returns a verdict specifying the offence of the suspected person, *e.g.* 'culpable homicide amounting to murder,' 'rash and negligent act,' etc. The coroner in India has the power to commit to the sessions direct.

In all cases of fatal accident and sudden and unexpected death under suspicious circumstances occurring in practice, the attending medical man should never grant a *death-certificate* when he cannot conscientiously certify the true cause of death, even should the family of the deceased press for a certificate to save the publicity of an inquest. It is his duty to report the matter to the police or the coroner direct; for afterwards if the magistrate or coroner be not satisfied that the death was from natural causes or simple accident they may have the body exhumed after burial, and if foul play be discovered make the medical man who wrongly certified an accessory to the crime. For instructions on the important question of *Death Certificates* see under that heading.

The Duties of a Coroner in India are thus defined: "Where a coroner has reason to believe that the death of any person has been caused by accident, homicide or suicide, or suddenly by means unknown, or that any person being a prisoner has died in prison and that the body is lying within the place for which the coroner has been appointed, the coroner shall inquire into the cause of death."—*The Coroner's Act* (Act IV. of 1871), *s.* 8. Other provisions are: That an inquest need not be held in a case where a prisoner has died in prison from cholera or epidemic disease.—*s.* 9. That the coroner may order a body to be exhumed.—*s.* 11. That the inquiry is to be conducted by the aid of a jury (of 5, 7, 9, 11, 13, or 15 in number) who, with the coroner, are to view the body.—*ss.* 12, 15. The coroner is empowered to order a *post mortem* examination with or without analysis of the viscera, to be made by any medical witness summoned to attend the inquest, and such medical witness, other than the chemical examiner to Government, shall be entitled to such reasonable remuneration as the coroner thinks fit.—*s.* 18. Evidence is to be given on oath (*s.* 19) reduced to writing by the coroner (*s.* 20), and the jury are to return a verdict (*s.* 23). A coroner may appoint a deputy coroner to act for him when sick, or absent from any lawful or reasonable cause.—*s.* 28.

Procedure in Courts.

To these courts the medical man is summoned to attend by a **subpoena,** a writ commanding attendance under a penalty. In civil cases it is necessary that a **fee,** termed 'conduct money,' should be offered on delivering the summons; if this be not done the medical man may, in civil cases, previous to being sworn, refuse to give evidence till any reasonable fee demanded has been paid. But it is chiefly with regard to criminal cases that the medical man has to give evidence, and he has no option

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but to be sworn and examined irrespective of the question of fees.[1]

Fees in cross-examination in criminal cases.—In support of a rule obtained on behalf of Iswar Chunder Ranth, calling upon the district magistrate of Dacca to show cause why the conviction and sentence passed on the petitioner should not be set aside and the trial resumed on the ground that the petitioner was not allowed to cross-examine the medical witness in the case, except on payment of the usual costs and compensation. The petitioner was convicted by an honorary magistrate of Narayanganj of causing hurt and was sentenced to six months' rigorous imprisonment and to a fine of Rs. 100 or, in default, six weeks' additional imprisonment. Their lordships made the rule absolute, holding that the petitioner was entitled, under *s.* 350 of the *C.P.R.*, to cross-examine the witness without payment of costs or compensation (Calcutta High Court).—*Englishman*, 23rd January, 1900.

On being called into the witness-box before your evidence is taken you have to be **sworn**. It is well for obvious reasons in taking the oath not to kiss the book, but to claim to be sworn by the more sanitary Scotch form. For this hold up the right hand above your head, and say in a loud, firm tone: "I swear by Almighty God, as I shall answer to God at the last day of Judgment, that I will tell the truth, the whole truth, and nothing but the truth." Then your evidence will be taken.

Medical Evidence.

Every fact which is referred to in law must pass through the process of proof by testimony. How this testimony is elicited in India is detailed in the *Indian Evidence Act* (Act I. of 1872). Evidence is given in two forms: (1) documentary, or (2) oral.

Documentary evidence comprises all documents produced for the inspection of the court. For the medical jurist this comprises:—

1. **Certificates** of death, ill-health, insanity, vaccination, etc.—*Death certificates* must be given free of charge if the medical attendant knows the cause of death, even though his attendance fees have not been paid; he "must give a certificate

[1] When a medical officer, other than a civil surgeon or medical officer of any grade in the civil employment of Government, is called upon to make a *post mortem* examination, he should be paid a fee of Rs. 16 for the same. Should he be summoned to give evidence in the case in court, he is not entitled to any further remuneration beyond the ordinary travelling allowance of a witness. For a medico-legal examination, other than a *post mortem* examination, the fee is Rs. 10 on the same conditions.—[Government of India, No. 1370, dated 23rd June, 1869, and No. 3050, dated 11th August, 1882.]

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to the best of his belief and knowledge," and "a reasonable excuse" must be given for withholding a certificate (see p. 98).

Medical certificates must now be signed by registered medical practitioners in Bengal and other provinces where the register has been instituted.[1]

2. **Medico-legal Reports.**—These are the formal reports of an examination made by a medical man under a warrant from a magistrate, coroner, or authorized police officer in cases of assault, murder, etc.

These reports (see Form in Appendix III.) should always be prepared with the utmost care; one of these may prove the death warrant of a murderer. The report should give (1) *Date* and *place* of examination and name of *witnesses*; (2) *External* examination (of living, pp. 31, 66, etc.; of dead, pp. 38, 74, etc.); (3) *Internal* examination in fatal cases (p. 95); (4) Reasoned opinion giving the inferences drawn; (5) Signature of reporter. All the times, dates, and numbers should be expressed in writing, and all articles submitted for examination should be labelled with a distinguishing number for reference, and the names noted of the officials or other persons from whom he received any articles, information, or who identified the person or body. Technical terms are to be carefully avoided unless their meaning is made clear.

The **opinion** based on the facts noted should be stated briefly and clearly, and given with the utmost caution (see pp. 71 and 98). For the apparent or alleged cause of injury or death is

[1] The Bengal Medical Act, 1914 (Bengal Act VI. of 1914) has since been brought into force, section 30 of which lays down that no certificate required to be given by any medical practitioner or medical officer under any Bengal Act or any Act of the Governor-General of India in Council in force in Bengal shall be valid, unless such practitioner or officer is registered under the Medical Acts or this Act. The Bengal Council of Medical Registration maintains under section 15 of the Act a Register of Medical Practitioners who are eligible under section 17 of the Act for such registration, and publishes annually, under section 32 of the Act, a list, entitled the "Annual Medical List," of the names for the time being entered in the Register of Registered Practitioners. The List of Qualified Medical Practitioners in Bengal has been replaced by this "Annual Medical List." In view of the provisions of section 30 of the Act, and as under section 25 of the Act, a registered practitioner, who gives a false certificate, is liable to have his name removed from the Register and consequently from the "Annual Medical List," the Governor in Council *now directs*, in modification of the orders contained in paragraph 2 of the Resolution of the 23rd July 1910 cited above *that medical certificates granted to non-gazetted officers of Government by registered Medical Practitioners whose names are borne on the aforesaid "Annual Medical List" shall be accepted without the countersignature of Civil or Presidency Surgeons as the case may be.* If, however, the authority concerned doubts the genuineness or veracity of any such certificate, he may institute an inquiry, the result of which shall be reported to the Bengal Council of Medical Registration.

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not always the real one; thus in India it is a common practice to hang up the dead body of a person who has been murdered so as to create a suspicion of suicide (see 'Hanging' in Chap. VII.), and there may be fatal concussion of the brain from a blow which cannot be ascertained by a *post mortem* inspection or dissection, but only inferred from the history of the case. If the medical attendant or registrar makes use of the history of the case, as supplied to him by the police or others, he should be careful to state this explicitly in his 'opinion,' *e.g.* "From the history of the case, and from the *post mortem* appearance, I am of opinion that the deceased died from shock caused by a blow"; and where the opinion cannot be given until after the result of chemical analysis of the viscera is known, this should be stated accordingly.

Both of the above classes of documents require to be sworn to orally as true by the person who drew them up, in the more serious cases; but the following documentary evidence is accepted *without* oral evidence in court: (1) Dying declarations, (2) Expert opinion from books.

1. **Dying Declaration.**

Statements, written or verbal, made by a person who is dead, as to the cause of his death or as to any of the circumstances of the transaction which resulted in his death, are admissible in cases where the cause of that person's death comes into question, no matter whether the person making such statement was or was not under expectation of death at the time of making it.—[*I. E. A.*, *s.* 32, and *Cr. P. C.*, *s.* 164.] If an injured person is likely to succumb, the doctor, failing the police, should arrange for the declaration to be made properly in the presence of a magistrate if possible, failing whom he may record the declaration himself.

The declaration should, if possible, be written by the person making it, otherwise it must be taken down in the identical words uttered by the dying man in his own vernacular, and nothing suggested or added. It should be read over to him and then, if possible, signed by him and attested by the writer, and any witnesses present. It should then be forwarded in a sealed envelope direct to the magistrate who would ordinarily inquire into the case.

At outlying dispensaries.—The hospital assistant in charge should at once call on the Sub-Deputy Collector or Tahsildár, or in his absence or when he has no magisterial power, the nearest honorary magistrate, to record the dying declarations

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of such persons as are likely to die and are in a fit state to make a statement. If there is, in his opinion, no time to call on the Tahsíldár or an honorary magistrate, he may record the dying declaration himself.

The State of Mind of the declarant at the time when he made his declaration is of great importance.

It may here be noted that according to the law of England; the person making a dying declaration must not only be actually moribund, but must have no hope of recovery and believe recovery impossible.

2. Printed opinions of experts.

Expert opinion expressed in any treatise commonly offered for sale, and the grounds upon which such opinions are held, may be proved by the production of such treatises, if the author is dead, or cannot be found, or has become incapable of giving evidence, or cannot be called as a witness without an amount of delay or expense which the court regards as unreasonable.—*I. E. A.*, *s.* 60.

Case.—An European, in a drinking bout at Calcutta, was found in his room, bleeding from a wound on the back of the head. A police-officer inquired, "How did this happen?" He replied, "She (his wife) threw a glass at me." The wife said, "Don't say that; you know I did not do it; he has fallen out of bed on a cup." The man was drunk, and never spoke rationally up to the time of his death, three hours after. Portions of the enamel of a tea-cup (bloody fragments of which were found scattered about the room) were removed from the wound before death, and some minute flakes of the enamel had been driven under the pericranium. At the *post mortem* examination traumatic extravasation of blood on the brain was found, attributed to *contre-coup*, and the universal medical opinion was that the wife's statement was the true one, and that when the man accused her he was not mentally in a condition to know how the injury had been inflicted. A fall upon a tea-cup could produce the appearances described, whereas the power of a woman's arm would be insufficient to throw a tea-cup with such strength as to force the enamel under the pericranium. The wife was acquitted.—Chevers, *Manual Ind. Jurisp.*, 93.

In the case of a **will by a dying man**, if no magistrate can be obtained, the medical attendant may record it, in which case the attestation clause should not be forgotten, and care should be taken that its conditions are strictly complied with:—"Signed by the testator A B, in the presence of us (there must always be two witnesses), present at the same time, who at his request, in his sight and presence, and in the presence of each other, have attested and subscribed the same." All alterations must be initialled by both testator and witness, as well as each page, and the foot or end should be signed by the testator or by some other person in his presence and by his direction. The testator must be conscious at the time when the witnesses attach their signature.

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3. **Evidence given** in a previous judicial proceeding by a witness who is dead, or cannot be found, or is incapable of giving evidence, or is kept out of the way by the adverse party, or whose attendance cannot be obtained without an amount of delay or expense which the court, under the circumstances of the case, considers unreasonable, is admissible under certain conditions (*s.* 33). Under this rule the deposition on oath of a dying person, taken by a magistrate in presence of the accused, becomes admissible in place of a dying declaration, and when the circumstances of the case permit, it is always advisable to take steps to obtain such a deposition.

4. **Deposition** of a civil surgeon or other medical witness, taken and attested by a magistrate in the presence of the accused, may be given in evidence in an inquiry or trial or other proceeding under the Code of Criminal Procedure, although the deponent is not called as a witness, but the court may, if it thinks fit, summon and examine the deponent.—*Cr. P. C., s.* 509.

5. **Any Document** purporting to be a report under the hand of any chemical examiner or assistant chemical examiner to Government, upon any matter or thing duly submitted to him for examination, or analysis and report, in the course of any proceeding under the Code of Criminal Procedure, may be used as evidence in any inquiry, trial, or other proceeding under the said Code.—*C. P. C., s.* 510.

Oral evidence must in all cases be direct, *i.e.* if it refers to a fact which could be seen, heard, or perceived in any other manner, it must be the evidence of a witness who says he saw, heard, or so perceived it; if it refers to an opinion, or the grounds on which that opinion is held, it must be the evidence of the person who holds that opinion on those grounds, and not mere hearsay.[1] Oral evidence is the more important of the two, as it admits of cross-questioning, so that the giver of documentary evidence is subject to be summoned for oral examination. If oral evidence refers to the existence or condition of any material thing, the court may require the production of such a thing for its inspection, viz. a blood-stained weapon, or article of clothing, a portion of eliminated poison, etc., etc. Hence such article should, always after examination, be preserved, if possible, for production before the court. '*Circumstantial*' evidence attests one of the subsidiary circumstances of the case, *e.g.* in case of an alleged stabbing of A by B on a river-bank at 4 o'clock on a particular day, circumstantial evidence would be that I saw B with a knife in his hand at ten minutes to four on that day near that place.

Witnesses.

Evidence is of two kinds, namely, (1) '**Common,**' or testimony to facts which the ordinary witness has actually observed

[1] *I. E. A., s.* 60.

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himself, and (2) **'Expert,'** or interpretation by expert persons or specialists of the facts observed by others, or of recondite observations by themselves. The medical witness usually gives evidence of both kinds, but in nearly nine cases out of ten as an expert. A **'Skilled'** or **'Scientific'** witness is a rather loosely applied term to mean a person of specialized knowledge of some technical subject and who may be an 'expert,' but who usually has no firsthand knowledge of the particular case. A **'Hostile'** witness is one who is assumed to have an interest or motive in concealing part of the truth or in giving positively false evidence.

1. A **'common'** witness testifies to the facts. "Fact," as defined by the Indian Evidence Act, "means and includes (1) any thing, state of things, or relation of things capable of being perceived by the senses; (2) any mental condition of which any person is conscious." The medical man is a common witness when he testifies to the exact size and number of wounds, blood-stains, etc., of a wounded person he has examined, the exact weight of solids and volumes of fluids he refers to, the circumstances under which he found the body, any statement or confession made by the dying person, the actual cause of death, etc.

All persons are competent to testify, unless the court considers that they are prevented from understanding the questions put to them, or from giving rational answers to those questions, by tender years, extreme old age, disease, whether of body or mind, or any other cause of the same kind (*I. E. A.*, *s.* 118). In certain special cases (*ib.*, *ss.* 121–129) a witness may, on certain grounds, claim exemption from being compelled to answer certain questions, *e.g.* "no public officer shall be compelled to disclose communications made to him in official confidence when he considers that the public interests would suffer by the disclosure" (*ib.*, *s.* 124). A witness is not exempted from answering questions on the ground that his answers would tend to criminate himself, but, if compelled to answer, his answers cannot be used as evidence against him (*ib.*, *s.* 132). In addition to the checks on untruthfulness of a witness afforded by the provisions of the Penal Code relating to the giving of false evidence (*ss.* 191–195), and the publicity of judicial proceedings, there is the most effective one of requiring evidence to be given *viva voce*, in presence of the party against whom the evidence is produced, who has the opportunity of cross-examining the witness.

2. An **'expert'** witness.—This is defined[1] to be a person "specially skilled in foreign law, science or art, or in questions as to identity of hand-writing or finger-impressions."

Examples of expert evidence.—(*a*) "The question is whether the death of A was caused by poison. The opinions of experts as to the symptoms produced by the poison by which A is supposed to have died

[1] *I. E. A.*, *s.* 45.

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are relevant. (*b*) The question is whether A, at the time of doing a certain act, was, by reason of unsoundness of mind, incapable of knowing the nature of the act, or that he was doing what was either wrong or contrary to law. The opinion of experts upon the question whether the symptoms exhibited by A commonly show unsoundness of mind, and whether such unsoundness of mind usually renders persons incapable of knowing the nature of the acts which they do, or of knowing that what they do is either wrong or contrary to law are relevant." —*I.E. A.*, *s.* 45.

Medical experts are skilled in such special branches as toxicology, obstetrics, insanity, etc., and also in the interpretation of wounds, etc., and when the medical witness is called on to answer questions of opinion either on the facts observed by himself or others, he becomes an expert witness, whilst the ordinary expert witness usually is asked merely for his opinion on certain facts of the case, and acts as an interpreter of facts without having personal knowledge of them. Previous personal knowledge of the facts of a case precludes a witness from taking any possible advantage of the *status* of an expert[1] as regards compulsory attendance at court, etc.

Case.—A medical man who has not seen a corpse which has been subjected to a *post mortem* examination, and who is called to corroborate the opinion of the medical man who made the examination and gave his opinion as to the cause of death is in the position of an expert.—*Queen Empress* v. *Meher Ali Mullick*, 15 Cal. 589.

The medical witness therefore must bear in mind this distinction between 'common' and 'expert' witnesses, and when stating facts of his observation, avoid giving opinions or inferences on these facts until asked to do so. It is, however, as an expert that he is mostly examined, and then it is a decision rather than evidence which the law demands of him when replying to such questions even in regard to facts observed by himself as:—Is this wound dangerous to life? Was the wound accidental, suicidal, or homicidal? Was it inflicted before or after death? With what kind of weapon was it inflicted? In answering such questions he should be careful to draw no stronger inference than the facts warrant, and when the facts do not warrant a decided opinion either way, he should state his reasons for being unable to give a definite opinion on the point. Experts may refresh their memory by referring to professional treatises.[2] The apparently contradictory character of expert evidence sometimes is largely owing to the partisan manner in which it is elicited. The expert is often a party witness, each side being permitted to employ expert witnesses, and they are asked by their side to answer questions on the assumed facts which are most favourable to their side. Then

[1] Manu, p. 9. [2] *I. E. A.*, *s.* 159.

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in cross-examination the expert has to answer fresh hypothetical questions based on an altogether different combination of the assumed facts with the view of contradicting the original evidence.

Examination.

Your oral evidence is taken in the following order:—[1]

1. **Examination-in-chief.**—This is a series of questions put to you by the counsel for the side on which you appear, with the object of placing before the court in a clear manner all the principal facts you know that bear upon the case in point. He knows from his '*brief*' the nature of your evidence, and is not allowed to put 'leading' questions. A '**leading** question' is one to which the answer is suggested by the tone and form of the question.

2. **Cross-examination.**—You are now subject to be questioned by the opposing counsel, with the object of weakening your evidence as far as possible, by trying to show how your details are inaccurate, conflicting, or contradictory. You are for him in the position of a '**hostile**' witness. You must be prepared even for questions calculated to disparage your skill. Thus in a question of criminal abortion you might be asked: You are not an obstetric surgeon? How many cases of midwifery have you attended during the past year? In cross-examination '**leading** questions,' *i.e.* questions which suggest the answer wished for or expected, may be asked; but if the question cannot be correctly answered in this way, you should inform the court accordingly, and in no case attempt to answer questions you do not clearly understand. Sometimes lawyers unfamiliar with medical science ask meaningless questions.

"Facts not otherwise relevant are relevant if they support or are inconsistent with the opinions of experts, when such opinions are relevant." *Illustration* (*a*).—The question is whether A was poisoned by a certain poison. The fact that other persons who were poisoned by that poison exhibited certain symptoms which experts affirm or deny to be symptoms of that poison are relevant.—*I. E. A.*, *s.* 46.

3. **Re-examination.**—This is made by the counsel of your own side for the purpose of explaining apparent inaccuracies or discrepancies in your statements which may have been brought out by your cross-examination. No new matter may be introduced at this stage without the consent of the judge or

[1] *I.E.A.* ss. 137, 138 *et seq.*

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the opposing counsel, and the opposing side may cross-examine on the fresh point. The judge and jury may question you at any stage to clear up ambiguous points. It often happens that the medical evidence is so little in dispute that no cross-examination is held.

Questions which may be asked.—For a list of many of these, see Appendix I, which should be carefully studied in detail, as several of them will almost certainly be asked.

Hints on Giving Evidence.

The medical witness should remember that he is not, and should not be, a partisan on either side. He has come to tell the truth, what he *knows* about the case, and not to clench the case against the prisoner. As he is not omniscient, he must not be ashamed to say, 'I do not know.' His evidence ought to impress the judge and jury, and, if he can, he should try to make his evidence a self-evident truth.

Notes in court.—All facts of medico-legal importance observed by you in a case should always be committed to writing in your own hand, on the spot, with precise time and dates, or as soon after as possible, and such notes may be taken to the court to refresh your memory, provided permission of the court is obtained.[1] But as the evidence of a witness must be oral, as far as possible, you are not allowed to read out such notes, as evidence to the court. In giving date and time state it precisely, 'On Tuesday the 9th December, 1919, I saw Mr. P., at 7.15 a.m.,' etc.

"A witness may, while under examination, refresh his memory by referring to any writing made by himself at the time of the transaction concerning which he is questioned or as soon afterwards that the court considers it likely that the transaction was at that time fresh in his memory. The witness may also refer to any writing made by any other person and read by the witness within the time aforesaid, if when he read it he knew it to be correct. Whenever a witness may refresh his memory by reference to any document, he may, with the permission of the court, refer to a copy of such document: Provided the court be satisfied that there is sufficient reason for the non-production of the original. An expert may refresh his memory by reference to professional treatises" (*I. E. A.*, *s.* 159). Any writing used to refresh memory must be shown to the adverse party if required (*I. E. A.*, *s.* 161).

Speak slowly, loudly, and distinctly, to allow both judge and recorder to hear easily, and to make notes of what you say.

[1] *I. E. A.*, *s.* 159; *Niz. Ad. Rept.*, 4th April, 1854.

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Use plain and simple language, avoiding technical terms which are not intelligible to non-medical persons, such as 'cicatrix,' 'contusion,' 'gastric mucous membrane,' 'pericardium,' 'ecchymosis,' 'traumatic,' etc.; employ instead 'scar,' 'bruise,' 'lining membrane of the stomach,' etc.

Avoid superlatives and exaggerations. Avoid such expressions as "there was an enormous bruise on plaintiff's shoulder, the blow must have been a savage one delivered with great violence," and that "the pupils were pin-points."

Be precise and concise. For example, be prepared to give the date and time of each event about which you have to give evidence, the exact measurement of wounds, the exact weight of solids, and volume of fluids, etc. Photographs should be utilized if available.

State facts only, not mere opinions, unless expressly asked for these latter. Thus, in the case of suicidal hanging, you should only certify to the fact of hanging, for whether it is suicidal, or homicidal, or accidental, is a matter of expert opinion or other evidence. Give your answers irrespective of the possible result on the trial.

Keep your temper during cross-examination. To lose it would convey the unfavourable impression to judge and jury that you are hasty in forming conclusions and therefore untrustworthy. If compelled to answer 'Yes' or 'No' to a question in cross-examination when it would convey a false impression, qualify it by an explanation; and appeal to the judge if you think any question unfair.

Professional secrets.—In a court of law a medical adviser is bound, if asked, to disclose otherwise inviolable secrets, if not self-incriminating, which he may have had confided to him professionally by a patient, as in questions of legitimacy, venereal disease with reference to divorce, etc. If the medical attendant through conscientious scruples refuses to answer, he is liable to be committed for contempt of court. In such cases it is well for the medical man first to appeal to the judge for a ruling, claiming privilege to decline to give such secrets, so that if the judge still rules that it is necessary for you to speak, it will be evident to all that you divulge these secrets only under compulsion of the law of the land.

Lord Mansfield in 1776 put it very clearly—"If a surgeon was voluntarily to reveal secrets, to be sure he would be guilty of a breach of honour; but to give that information in a court of justice which by the law of the land he is bound to do, will never be imputed to him as any indiscretion

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whatever" (Duchess of Kingston's trial for bigamy, 20 S. T., pp. 573, 735). Certainly even in *civil* (non-criminal) cases there is a great deal to be said in favour of the existing law, for surely in the interests of humanity and purity it seems undesirable that a woman to whom a loathsome disease has been communicated by a dissolute husband should find herself chained to him for life, and be unable to gain the ordinary means of redress, because the only witness who can prove this material medical fact has scruples of conscience, or is technically excluded from testifying. *For further remarks on this subject* and a case successfully resisted, see Chap. XIX., on 'Medical Obligations.'

Quotation from books.—You are not allowed to quote in your replies any books by an author who is alive, on the principle that evidence should be oral, and the giver of it should be present for cross-examination. Books are sometimes quoted in court by counsel, and the witness is asked whether he agrees with the quotation. In such cases the witness should, before replying, ask to be allowed to read it over himself, and see whether the context does not give it a different meaning from that assumed for it by the opposing counsel.

In giving an opinion in court be well prepared beforehand, by having considered the various points on which you are likely to be called upon to give an opinion, what inferences drawn from the facts would tend to support either side of the case. Consult the works of the leading authorities on these points; ascertain what opinions are therein expressed, and the grounds on which such opinions are based, and frame your own opinions with due regard thereto. Be careful to draw no stronger inference and give no stronger opinion than the facts warrant. It frequently happens that the facts available do not justify a conclusive opinion being given one way or other: in such a case do not hesitate to state so; but be prepared to state precisely your reasons for being unable to give a definite opinion on the point.

Lying in Forensic Psychology.

Lying is one of the great difficulties with which the Medico-legal expert, in common with the Judge, has to grapple in Europe, and it is by no means less prevalent in India. Children, otherwise mentally sound, especially if their moral education has been defective, or they have been associated with liars, may occasionally tell a lie from motives of fear, or to gain some private desire, or screen a friend, at a period when they are not yet able to distinguish clearly between their desired ideal and the moral quality of the means employed to obtain it. But it is the adult liars who lie deliberately with the purpose to

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deceive, with whom we have seriously to deal, and for whom there is no such excuse, and who constitute a menace to society and civilization.

Habitual lying, to a greater or less extent, appears to be much more prevalent in civilized communities than is generally admitted, although only a relatively small proportion of the individuals who practise it find their way to the criminal or police courts. It inevitably tends in the direction of crime, and is associated usually with some physical defect in the brain; it is absent relatively or absolutely in the higher normal and well-balanced types of brain and intellect, to which lying in all its forms is repugnant; while it is notoriously prevalent in degenerates, imbeciles, and insanes. A common feature which the habitual liar shares with the feeble-minded, epileptic, hysterical, and insane, is that they are not a whit abashed at being found out. They are thus "Pathological Liars," in contradistinction to the "Occasional Normal Liar," who tells a lie occasionally to conceal some inconvenient truth, or it may be deliberately to get some person, against whom a spite is cherished, into trouble—a common motive both in India and in Europe. Between the habitual and occasional lying comes a good deal of partisan literature other than "fiction," and certainly that of belligerent politicians in war-time, who thus approximate to the imbeciles and insane.

The Pathological Liars, however, are seldom so completely diseased as to be altogether insensible to the difference between right and wrong, even when subject to hallucinations. They usually know their stories are false, but they wish they were true, and they hope by cunningly contrived plausibility that people may be deluded into accepting them as true. They are often extremely clever and personally attractive. Some enjoy success as swindlers, others have caused grief to their families by figuring in *causes célèbres* in which they accused their parents or guardians of the most abominable crime, weaving tales so plausible as to deceive the general public.

An interesting analysis of the antecedents and psychology of over sixty well-authenticated cases of such inveterate liars has recently been published by the Drs. Healy,[1] which shows that invariably there has been some mental defect in the family, which may range from mere inability to resist alcohol up to actual insanity. The patient herself—for it is to the female sex that most pathological liars belong—generally has shown a tendency to excessive lying in childhood, in the years when character is forming. In some cases this may have been

[1] *Pathological Lying, Accusation, and Swindling.* By W. Healy, M.D., and Mary T. Healy, B.L. London, 1915.

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imitative in a home where some member of the family was notorious for lying, or keeping up a social position by "make-believe." In other cases it may be due to the influence of bad companions. Often a good conversationalist and sometimes a ready writer, "she is *intensely self-centred, caring nothing for the opinion of others. Though prone volubly to embroider facts or invent interesting occurrences in which she plays a leading part, she is as a rule suggestible. Very often she runs away from home* and is found by kind-hearted strangers to whom she tells a thrilling tale of how her parents beat her, till it dawns upon the philanthropist that he is harbouring an incorrigible liar; though on the other hand, owing to their innate cunning, they may never be found out and exposed." Such are the class who bring false charges of immoral assaults. Habituées to the abuse of alcohol, morphine, and cocaine are also especially addicted to lying to conceal and facilitate their vice, and may be classed as pathological liars, who tend in the direction of crime.

It is only by careful questioning, cross-questioning, and traps carried out at more than one interview, that one is likely to elicit the real facts and reconstruct the true case.

Special Difficulties in detecting Crime in India Medico-legally.

Some of the special difficulties in the way of the medical jurist in India getting at the truth in criminal cases are due to:—

1. Rapidity with which decomposition destroys dead bodies in the hot climate.
2. Facilities for concealing and destroying dead bodies, together with the general practice of rapid cremation or burial a few hours after death.
3. Insufficient particulars of crime in the police reports accompanying the alleged assaulted person or a decomposed dead body.
4. Untrustworthiness of so much native evidence, owing to the wide prevalence of false swearing and fabricating false charges.

1. **Rapid decomposition.**—This tends to obliterate the traces of the cause of death whilst rendering the autopsy very trying to the medical officer, whose duty nevertheless is to perform the examination as thoroughly as possible. The despatch of the dead body or its preliminary examination is often in country districts delayed in the hot weather for several hours with

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consequent loss of evidence, owing to the responsible official shrinking from contact with the dead body until evening or the next day, as contact with a corpse prevents a Hindu mixing with his family or friends until purified by more or less elaborate ceremonial bathing. For this reason, a fudged report may be sent in without the body having been inspected at all. When, as often happens, the body does not reach the medical officer for examination until several days after death, after having been carried scores of miles in the heat on men's shoulders, it is then in such a horrible putrid condition [1] as to make even an external inspection very trying, and detailed dissection useless. It is thus necessary that the police report accompanying the body should furnish the medical officer with sufficient particulars to indicate the direction in which he should pursue his search into the cause of death. Otherwise when decomposition has fully set in he cannot be expected to throw much light on the cause of death. Nevertheless it is well never to refuse to make an examination even in such cases. For wounds inflicted during life can, for a considerable time, be distinguished in the dead body from those inflicted after death and from mere decomposition changes. Certain tissues, such as those of the uterus,[2] resist decomposition for a long time; certain poisons (such as arsenic) may persist for many months, fractures will be evident, though, if the decomposition is far advanced, it will be difficult to say whether the fracture occurred during life or not, and some important identification marks may be elicited.

2. **Rapid cremation or burial of bodies.**—The bodies of Hindus on death are cremated and those of Mohammedans are buried on the day of death, usually a few hours after apparent death. European residents also are almost invariably buried on the day they die. Besides these legitimate methods of disposal, very poor people often throw the bodies into rivers and lakes. Unusual facilities thus exist for destroying traces of murder by concealing the dead bodies in rivers, wells, ponds, swamps, dry watercourses, thickets of waste land and jungle, rubbish heaps, standing crops, stacks of wheat or straw, or heaps of chaff. Most of these places are infested by carrion feeders (dogs, jackals, vultures, crows, crocodiles, fish, rats, etc.),

[1] Although the statute [*C. P. C.*, s. 174 (3)] expressly states that bodies have to be sent for medical examination in doubtful cases, only "if the state of the weather and the distance admit of its being so forwarded without risk of such putrefaction on the road as would render such examination useless"—this provision is not usually observed, and the thin sprinkling of wood-charcoal does little to check the advancing decomposition.

[2] *Niz. Ad. Rept.*, N.-W. P., 1854, 204; *id.*, 1852, p. 1121.

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which soon mangle the corpse beyond recognition or reduce it to a skeleton. The commonest way of disposing of the body of a murdered person in the plains is to throw it into a river, or into a disused well—for this purpose it may be trussed up and carried many miles from the scene of murder, or tied to a pole and dragged along if the murderer be single-handed. The next most common way is probably to hide it in the jungle. Occasionally such bodies are buried under the mud floors of houses, and usually in the house of an innocent party. Certain Hindus who murdered a fellow-Hindu and his mistress plotted to bury the woman's body in a Mohammedan grave, which no one would think of opening, and to leave the man's body in the house to make it appear that he had been murdered by his mistress, who had absconded. A case came under my [1] notice where the body of the murdered man was buried in the bed of a hill stream, which for this purpose had been diverted from its channel and then turned on again.

3. **Insufficient particulars in the police-report which accompanies the body.**—In India the medical officer rarely sees the dead body when and where it is found, and has to depend for such important information on the meagre and vague reports of untrained persons. Such statements as "believed to be beaten," etc., are often contradictory, and give little useful or trustworthy clues. Although it is a principle in England that the medical officer should be furnished with as full particulars as possible to assist him in finding out the true cause of death, this principle has been objected to by an Indian judge.[2] If, however, the medical officer, who holds the position of a police-surgeon, be purposely kept in the dark as to the facts and ascertained circumstances attending a death on which he has to report, with only the decomposed body available for examination, there must necessarily be a great likelihood of justice miscarrying.

[1] L. A. Waddell. It occurred in the Ranchi District of Chota Nagpur in 1886, while I was acting there as civil surgeon.

[2] The civil surgeon of Cawnpore, in 1852, with reference to a body which had been sent to him without particulars as to the alleged cause of death, asked that in future he should be supplied with the history of the bodies sent to him for report, so that he might have some guide to the organs most requiring scientific examination. But the sessions judge thought "this would interfere with a principle of criminal justice and would be analogous to putting leading questions, the answers to which would not be evidence, nor would it be fair to the prisoner, for though a severe sword-cut might be reported on, the presence of a disease, lung or spleen, might pass unnoticed, though the actual cause of death." The superior court in their remarks on this case decided that "the communication which had passed between the sessions judge and the civil surgeon was altogether irregular and objectionable."—*Niz. Ad. Rept.*, N.-W. P., December 21, 1852.

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4. Falseness of much of the evidence given by natives of India.

> "*No crime causing loss of caste is committed by swearing falsely to women the object of one's desire, at marriages, for the sake of (procuring) fodder to a cow, or fuel (for oneself), and in order to show favour to a Brahman.*" —MANU CODE 11, 26.[1]

> Yet the disgrace of perjury is also insisted upon: "*Naked and shorn, tormented with hunger and thirst and deprived of sight, shall the man who gives false evidence go with a potsherd to beg food at the door of his enemy.*"—MANU, 9, 235, 319, 325.[2]

The untrustworthiness of native evidence in India is notorious. In nearly every case in law, more or less false evidence is given, whether it be from fear, stupidity, apathy, malice, or innate deceit. It is referred to by the Privy Council as[3] "the lamentable disregard of truth prevailing amongst the natives of India." As regards Bengal, the Inspector-General of Police[4] states that this "is a country where perjury is the rule and not the exception, where no man will tell the whole truth or the simple truth . . . where false witnesses can be bought for a few annas." The constant difficulty, therefore, is to sift the truth from the falsehood. Such false charges are generally supported by marvellously minute direct and circumstantial details. The "too perfect" character, indeed, of such evidence at times leads to it being suspected and its falsity exposed.

A very common form of conspiracy is to cause a person to disappear, and then to charge with murder some person against whom a spite is cherished. A plausible explanation is given of the disappearance of the body of the alleged murdered person, or a putrid corpse is obtained from the adjoining river and, gashing it in several places, it is brought forward as the remains of the missing individual. In such conspiracies circumstantial details are not infrequently sworn to by several persons, testifying as eye-witnesses to alleged facts of the murder, to the burial of the corpse, etc., so that conviction for the murder may be duly passed, and the falsity of the whole

[1] *Laws of Manu.* Translated by G. Buehler. [2] *Id.*
[3] Cowell, quoted by Chevers, *M.*, p. 86.
[4] *Rept. Beng. Police* for 1866, pp. 10, 53.

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proceedings not be discovered until the reappearance alive of the alleged murdered person.

Cases.—(*a*) **False evidence.**—Ibrahim Beg, a wealthy *mahājan* (merchant), was convicted of the murder of his young wife Chumbelee. On the day previous to the one appointed for the execution of the convict, an individual informed a young English civilian that Chumbelee was alive, and led him to the place where she was kept concealed by a gang of *fakirs* in a subterranean chamber of a tomb. It then turned out that the whole affair was a conspiracy got up by a man named Khan Beg, the *mahājan's* next heir. This man, with the assistance of one of the *mahājan's* servants, first excited Ibrahim Beg's jealousy, and led him to beat his wife. Her loud screams were heard by the neighbours. They then abducted the wife and handed her over to the *fakirs*, in whose custody she was subsequently found. Just before the quarrel between Ibrahim Beg and his wife, the conspirators had got hold of a female body. They cut off the head of this, put on the arm of the corpse one of Chumbelee's bangles, and buried the body in the courtyard of Ibrahim Beg's house. Here it was discovered on the day after the quarrel, and was supposed to be the body of Chumbelee. The man who gave information that Chumbelee was still alive was a subordinate in the affair, who was dissatisfied with the remuneration given him for his services.—Chevers, *Man.*, p. 54.

(*b*) Regarding another case, the sessions judge wrote:—"It would be impossible to imagine a case more completely satisfactory as regards at least the guilt of Abdool Kurem [the falsely accused] than this, because when the [police] darogah's report was completed, and as in fact it remained until the appearance of Pertab Narain [the alleged murdered man] brought to light its real character. The prosecutrix was the mother of the missing man, the principal witnesses were his wife and his cousin, while the prisoner's own servants detailed at length circumstances attending the burial of the body. There were no inconsistencies and no contradictions in the evidence, which from first to last gave the hearers the impression that a heinous crime had indeed at last been brought to light, in spite of a powerful combination to conceal it."—*Niz. Ad. Rept.*, 1853, I. 259. Other cases of this kind.—*Niz. Ad. Rept.*, N.-W. P., 1854, 381; *Police Rept.*, L. P. 1844, p. 37.

False confessions of fictitious murder.—The falsely accused persons, even when not the subject of delusional insanity, may confess to have done the alleged murder and yet the alleged murdered person appears alive in court:—

Case.—In the Mirzapur district, a Rajput widow known to be unchaste eloped with a paramour. The headless body of a woman was found in a well, and was supposed to be the body of the widow who had eloped. The widow's brothers were charged with her murder, confessed their guilt (?), and were convicted. Just before they were sentenced the missing widow appeared; she had heard by chance that her brothers were charged with killing her, and came forward to clear them. The brothers said they had confessed to the murder because they thought it was hopeless to plead innocence.—Chevers, *Med. Jur.*, p. 69.

False evidence fabricated by police.—The native police, whose duty it is to make the preliminary report on criminal cases, are drawn from the ranks of the masses, and many are

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still credited with suppressing incriminating evidence for a monetary consideration, as well as with extorting false confessions by torture or threats through mistaken zeal or other motive, all tending to obscure the truth. Thus a head constable at Rangpur in Bengal induced a woman to say that a certain corpse found floating on a river was that of her adopted father. He further instigated her to charge five men with the murder. At this juncture a sub-inspector took up the case, and the five men were arrested and kept for the night in the custody of these constables, who maltreated their prisoners and thereby induced them to confess that they had committed the murder. When the trial was going on the missing man came into court.[1] Again a sessions judge records:—"I do not credit the evidence of the eye-witnesses as to the place where and the mode in which the wound was inflicted . . . the eye-testimony of the knife and the blow on the road was an after-thought of the police to make the case more complete according to their infamous custom in these parts."[2] So much suspicion clings to the evidence offered by the police that it is specially enacted that[3] "no statement made by any person to a police officer in the course of an investigation under this chapter shall, if taken down in writing, be signed by the person making it, nor shall such writing be used as evidence."

The Indian Criminal.

Indian experience generally supports the modern school of criminal anthropologists in regarding the criminal as a degenerate. Lombroso's hypothesis, which originally was that a criminal type exists exhibiting a physical neurosis, or degeneration of the brain that enables us to recognize a malefactor from birth, has now undergone a good deal of change. So far, no physical signs which point to absolute criminality have been discovered, any more than it has been possible to discover the external marks of invincible honesty. Yet, although the great malefactor is not usually a madman, but exhibits a marked degree of self-control, lower down in the scale of criminality, it is often very difficult to decide how far the creature in the dock is truly responsible. Certainly, prisons all the world over contain a considerable proportion of persons under punishment who are little better than half-witted. The population of almost any of the large prisons exhausts the scale

[1] *I.-G. Bengal Police Rept.*, 1866, p. 47.
[2] *Niz. Ad. Repts.*, V., Part 2, 1855, p. 812.
[3] *C.P.C.*, s. 162.

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of unfitness, and from it is recruited a good deal of the population of the lunatic asylum.

The classification of criminals by Lombroso still holds generally good, namely (1) the *political criminal*, who may be, as the Italian sociologist calls him, "the true precursor of the progressive movement of humanity," and may be the hero, martyr, or even saint of another land or age; (2) the "*criminal by passion*," usually distinguished by a previous honest life and genuine remorse; he never becomes a recidivist, his crime is usually a solitary event in his life, and careful examination as a rule fails to show any striking evidence of abnormality, degeneration, or hereditary taint in the political criminal or the criminal by passion; (3) the *occasional criminal*, who has an element of innate criminality which leads him to commit crime when an opportunity offers, and bad heredity is common in this class; (4) the *habitual, or professional criminal*, who deliberately adopts a career of crime, and commits it either helplessly, the degenerate class, or with great intelligence, the aristocracy of criminality; (5) instinctive or congenital criminals (*criminel-né* of the French, *delinguente nato* of the Italian). Lombroso identifies the instinctive criminal with the moral insane. Criminals of this class form only a small percentage of the prison population, but they are the most serious proportion. They frequently present well-marked physical and psychical signs of abnormality, degeneration, or disease. They reveal criminality in its most pronounced shape, and they are related on one side to the occasional criminal, and, on the other, pass gradually into (6) the *insane criminal*, without any clear line of demarcation between them.

That the criminal is "an epileptic more or less in disguise" is no longer held, as it is not supported by fact; but that the criminal type is often a "*professional*" type has a good deal in its favour, though the rapid extinction of vicious families who choose such a career is not favourable to the hereditary transmission of such aptitudes.

As an outcome of this conception of the criminal as a degenerate and a more or less half-witted person, there has been put forward the ethical and eugenistic plea for the reclamation and education of the criminal, less rigorous punishment, and the total abolition of the death penalty, for no doubt crime springs from conditions which punishment cannot touch. But these questions are outside the scope of this book.

The Indian criminals are perhaps, broadly speaking, of a somewhat milder and less vicious type than the average criminal in Europe. There are relatively fewer of that gross, anti-social type of moral monster who infest society under the

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stress of the higher civilization. The great majority of violent criminals and murderers in India are "*criminals by passion*," fairly well-meaning and generally law-abiding men, who, stung into sudden madness by some insult or wrong, real or fancied, to themselves or families, take justice or retaliation into their own hands, and so find themselves in the clutches of the Law. A large number are criminal through natural stupidity and want of self-control, rather than inherent wickedness.

Moral Insensibility, a truly criminal trait, is, however, often seen in atrociously unnatural motives for crime in India. It appears also to enter into the well-known apathy, usually considered fatalistic, amongst natives of India, towards saving life in accidents. People will look on calmly at the struggles of a drowning man without attempting to render him assistance, and often do not attempt to save the victims of attempted murder. Thus, a young woman was seen by a man at noon to throw a boy of ten down a dry well twenty feet deep. The man never attempted either to catch the murderess or to help the child in the well. He excused himself by saying that he had a boil on his foot and a load on his back. Without throwing down his load he went on to his village, and informed the child's father. The latter, again, made no attempt to recover the body until the evening.

Inhuman *callousness* is sometimes displayed: thus, a woman murdered a child for its ornaments, which were worth less than six rupees (about eight shillings), and was found burning the child's body at her own fireplace (*Beng. Pol. Rept.*, 1866, 172).

Murder of own family to fasten a charge on an enemy.—The victim is usually an old infirm person or a child. Numerous such cases occur every year. A woman in Patna district poisoned her own little daughter, and concealing the body on the premises of a neighbour with whom she was at enmity, accused him of having murdered her.[1] "A man in Jhansi (1885) killed his daughter because his neighbour had slandered her in order that the girl's blood might be upon the neighbour's head. A master murdered his servant (1881) and threw the body before the door of his enemy solely in order to bring a false charge against the latter. A similar case occurred in Azamgarh five years later; a boy was murdered by his grandfather and uncle; they threw the body into a sugar-cane field, and then charged the owner with the crime. A still stranger story comes from the Mathura district. Randhir, a Jat, who

[1] *Bengal Police Rept.*, 1868, p. 139.

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had once been a thriving man in Randhirpur, fell into the hands of the money-lenders, lost his property and his house, and became for some crooked reason embittered against his old fellow-villagers. He made up his mind to bring them into trouble. Taking his chopper with him, he met a little *chamár* girl, whom he took into a temple in Bahadurpur. There he cut her throat and slightly wounded himself, and then brought a charge of dacoity and murder against the people of his old village."[1] A man sentenced at Cawnpore as accessory to the murder of his own sister confessed that the deceased's own son and another relative had beaten her to death and had absconded with her property, and that he afterwards witnessed the partial burial of her body in one of the apartments of the house in which they all resided as a joint-family. He had deceived the neighbours as to the cause of the unpleasant effluvium which proceeded from his house, by attributing it to the death of a snake in one of the drains. The body was found several days after the murder in a locked room, the key of which was in the prisoner's possession.[2]

Case.—(*a*) **Murder of father by son** amid crowd of witnesses in broad day *to lay false charge at another man's door.* In 1902, a dhobi of the village of Kalanjari, thana Jani, in the district of Meerut, found that some clothes which had been given to him to wash had been stolen. He suspected two Dhanuks of the village, who had been in his service as watchmen, and a relative of theirs, and brought them before the zemindars. The Dhanuks protested that they knew nothing about the clothes, so the dhobi, Ramzani by name, reported the matter at the thana. The head-constable of Jhani and two other constables returned with Ramzani to investigate the matter, and the head-constable took up temporary quarters at the house of a Jat zemindar named Jhunku, this apparently being the customary thing in the village. After making several inquiries, and inspecting the hut from which the clothes had been stolen, the head-constable, whose name was Niaz Ahmad, called several zemindars to the house of Jhunku, presumably to assist in the inquiry, and afterwards sent a chaukidar to fetch the three suspected Dhanuks. In answer to the summons, about a dozen Dhanuks turned up with their women-folk, making a great noise as they approached Jhunku's house. They were armed with *lathis*, and evidently meant mischief. Niaz Ahmad asked them the reason of this conduct, and one Siria, who seems to have been the ringleader of the party, replied, "Jhunku wants to get us all summoned. We have come to see how he will do it." Jhunku replied, "Why should I have you summoned? Those who are the thieves will be *chalaned*." The head-constable added, "Don't make a noise, justice will be done." "How will justice be done?" replied Siria, "we will get Jhunku summoned first." Saying this, Siria gave an old Dhanuk, who was standing beside him, a push, with the result that the old man fell, striking his head against the *chabutra*. The old man was Siria's father, Chimman by name, and was about sixty-five years of age. Several of the Dhanuks then cried out, "Kill the old man and accuse Jhunku," and

[1] Kitt's *Serious Crime in an Indian Province*, 1889, pp. 14, 15.
[2] *Niz. Ad. Repts.*, N.-W. P., 1853, p. 765.

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several of them began to strike the prostrate man. They seized the man by the legs and dragged him fifteen paces away, and then Siria jumped on his chest. The police and zemindars appear to have made some ineffectual attempt at rescue. The Dhanuk tumbled the old fellow on to a charpoy and marched away in the direction of Meerut. There are two witnesses who state that they encountered the party on its way to Meerut, and that the Dhanuks told them that Chimman had been assaulted by Jhunku, and that they were taking him to the police-station. Chimman, however, feebly protested from the charpoy, saying that he had been assaulted by the Dhanuks themselves, and that they wanted him to bring a false case against Jhunku. By the time they reached Meerut old Chimman was dead, and the Dhanuks charged Jhunku and several others with the murder, saying that the reason for the crime was that Jhunku and the police had demanded money from them in connection with the theft case, that they had refused, saying that they had none, that Chimman had expostulated, and that for this he had been done to death with *lathis*. The magistrate and the judge both disbelieved the story of the defence and believed the story told by the police and the zemindars. The magistrate characterized the crime as most strange, unnatural, and revolting, and the judge agreed with him. He sentenced Siria to be hanged, three others to be transported for life for the murder, besides finding them guilty of fabricating evidence against Jhunku, with the intention of causing him to be convicted of murder. He found six more Dhanuks guilty of abetment of the second crime and sentenced them to various terms of imprisonment.—Allahabad High Court, JJ. Knox and Blair, 1902.

Case.—(*b*) **Murdering adult brother.**—On the morning of the 17th December, 1901, the decapitated body of one Tahal Singh was found in the field of Pertap Singh in the Gurdaspur district of the Punjab. Suspicion was at first directed against Pertap Singh, but the police were able to discover that on the night of the murder the deceased had been last seen in the company of certain persons including his own brother and the lumbadar of the village going towards the field where the body was found next morning. "It also transpired," we quote the words of the police report, "that on the 16th December the murdered man and his brother Mahal Singh were drinking at a liquor shop in Nowshera, and there the murdered man, who was rather intoxicated, invited certain friends to drink with him saying it was the last opportunity they would have, as he would soon be in two or four pieces. The brothers then went to Kotla, where the other accused were assembled, and had more drink." By the advice of the public prosecutor a pardon was offered to the brother of the murdered man, and his story was as follows:—"He, his brother, Tahal Singh, and the lumbadar, were great friends, and they had a common enemy in one Pertap Singh of Bulewal, between whom and themselves there had been a considerable amount of litigation. At the time of the murder Pertap Singh had brought a charge of assault against him and his murdered brother (Tahal Singh), and Pertap Singh's son had a similar charge pending against the lumbadar. They arranged that Tahal Singh should be murdered, his body put in Pertap Singh's field, and a charge of murder brought against him. Tahal Singh consented to be killed for this purpose of revenge. On the night in question the party proceeded after a drinking bout to Pertap Singh's field, the lumbadar carrying a *gandasa*. On arriving at the field accused No. 1 threw Tahal Singh down, and he and the lumbadar gave their superfluous clothes to accused No. 5 to hold. The lumbadar then seized the murdered man by the hair, while he himself and Bela Singh, accused

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No. 4, each seized a leg. Budha Singh, accused No. 1, decapitated the deceased with the *gandasa*. All then went to Kotla, where they washed their hands and feet at a well and burned some of the murdered man's clothes in the lumbadar's courtyard. The *gandasa* belonged to accused No. 1 and was found in his house by the police."—*C.M.G.*, 11th Feby., 1902.

Case.—(*c*) **Butcher murders his child** to please paramour.—In June, 1901, before the Allahabad High Court, Mula, a butcher of the sweeper caste, resident of mohalla Naimandi, Rekabganj, Agra, was convicted for the murder of his daughter, a child of four years of age. According to the evidence and the confession of the accused, Mula had had an intimacy with Musamat Koka, a sweeper, and used to live at her house. Shortly before the murder took place Koka left Mula and went back to live with her own husband. This seems to have put Mula into a state of fury, and he threatened to cut off the woman's nose. On the night before the murder he visited her and during his visit struck the woman's year-old child. According to Koka, the man threatened to kill the child. The woman got into a rage and cried out, "Why should you kill her, you give her neither food nor drink; why don't you kill your own child?" According to the accused, the woman asked for the body of his own child. Mula went away and slept in his own house that night. In the morning he took his daughter to the slaughter-house, where he was employed as a butcher, and cut the child's throat in the manner animals are slaughtered. The man then took the body of the little girl to the house of Koka and entered the room in which she and her husband were sleeping. Before awaking Musamat Koka he laid the body of the girl on a bed on which Koka's husband and Koka's son were sleeping. He then roused the woman and asked her to give him a smoke, saying, "God knows whether I shall live or die." She pointed out the tobacco at the fireplace. He brought fire from the fireplace and prepared his *chilum*. He then asked the husband to smoke, addressing him in the same words, and the husband waking up, asked what was the matter. He showed him the body lying on the charpoy and said he had killed the child at the bidding of Koka.

Self-murder in revenge.—Cases are sometimes met with in which an individual who has been injured by another kills himself under the idea that he thereby throws the responsibility for his death on the person who has injured him. Instances quoted by Chevers show that, under the name of '*chandi*' this form of suicide was a well-known custom among the ancient Rajputs. A variety of this description of suicide is the practice known as sitting '*dharna*' or starving himself at the door of an enemy or debtor. Again, Chevers mentions a case of a man at Singapur who cut his throat at the door of his neighbour in order to try to get the latter hanged.

Parents sometimes conceal the murder of their son or daughter, and report the death as being due to attack by wild beasts or suicide.[1] So common is this moral insensibility to natural ties that the High Court refers to it as "instances of persons consenting to forego the prosecution of those who have

[1] *Beng. Police Rept.*, 1849, p. 8.

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committed the most serious injuries to their persons or properties are within the common experience of every magistrate in this country."[1]

Some Special Causes of Crime in India.

A good deal of the crime against the person in India is the result of the primitive social state of the mass of the people and the observance of semi-barbarous cults and traditions handed down from the past, and often based upon primitive tribal instincts of self-preservation, but which now under British rule are illegal and criminal.

Traditional Customs.—Many such practices which nowadays under British rule are crimes were not deemed to be such under Hindu and Mohammedan rule. Instances of these are the burning of widows alive on the funeral pyre; female infanticide; burial of lepers alive; 'justifiable suicide'; condonable murder or manslaughter (see below); and avenging certain wrongs, *e.g.* adultery, by taking the law into one's own hands. In ancient India the avenging of all criminal justice remained in the hands of those who were wronged; and still to the present day it is not fully recognized that the enactments under British rule have diminished the sphere of private revenge. *Mutilation* of nearly every part of the body was authorized as a punishment in Hindu law. Thus, the hand or foot, both hands, one hand and one foot, both hands and both feet, buttock, lip, penis, testicles, pudenda, rectum, ears, nose, breaking the teeth, finger or fingers, piercing or gouging out the eyes, etc., were specified punishments. *Burial alive* was a recognized Mohammedan torture, and Hindu sacrifice is still sometimes practised even nowadays. *Torture* is still believed to be often resorted to clandestinely by the police to exact evidence, and trial by ordeal is still not infrequent.

In the Vedas the crime of manslaughter (*Vaira-hatya*) was condoned on payment of the price or blood-money termed *Vaira*, payable to the relatives of the man killed. The scale of payment prescribed was 1000 cows for a person of the Ksatriya caste, 100 for Vaiśya, and 10 for a Sūdra; and over and above this was in each case a bull which it is supposed was the perquisite of the king for his judicial intervention. The crime of slaying a Brahmin was too heinous for a fine. It was a sin which could only be expiated by the performance of a horse-sacrifice (*Aśvamedha*), the *ne plus ultra* of generosity to Brahmins. In this sacrifice the human victims seem to have included not only the plaintiff and defendant but also the arbitrator.—*Vedic Index*, Macdonell and Keith, 1912, I., 331, 391, 393.

[1] *Niz. Ad. Repts.*, Vol. VI. (1856), p. 801.

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Five kinds of suicide are considered justifiable by Hindus: It is written in the *Brahma Purana:* "Let the man who is afflicted with a grievous and incurable disease enter a burning fire, or procure his death by starvation, or by plunging into unfathomable waters, or by precipitating himself from an eminence, or by ascending to paradise by a respectful pilgrimage to the Himalaya Mountains. Whoever relinquishes life under these circumstances, by precipitating himself from the sacred *vista* tree at Prayága, or, his time being come, destroys himself, that high-minded person shall receive a great reward in a future state, and shall not be considered a suicide; even although he might have been a great sinner, he shall meet with supreme bliss in paradise. The privilege of practising the above-named austerities is extended to the human species in general, without restriction either in regard to sex or tribe.—Macnaughten, *Niz. Ad.*, I. pp. 220-1.

Cases.—(*a*) **Intentional live-burial of wife.**—In 1907, in the Betul district of the Central Provinces, in the case of a man, Dama, charged with the murder of his wife, it was proved that the wife, Indro, had been for a long time suffering from chronic dysentery, and on 29th January, 1907, the woman's husband, Dama, the accused, took her and the family away to another village, where he abandoned his sick wife and returned home with his children, and stated that he had left his wife with a *bhagat* or exorcist for treatment. The village authorities sent the poor woman to another village where the husband was sent for, and his wife made over to him, and a cart and bullocks lent him to take her to his home. The accused took the cart, but came back the same day saying that the wife had died on the way and he had buried her. He was ordered to go and report the death to the *Kotwar;* he made no such report, but returned to his own village, and there stated that his wife was alive and under treatment of the *bhagat.* On the sixth day after the alleged death of the woman a villager saw something move in the jungle, and his cattle shied when they went near the place. The next day this villager told the *Kotwar* of this strange incident, and they went and found the mysterious grave, with the leg of a woman clearly visible. They then heard the buried woman say, "I am not dead," and she then told the *Kotwar* that her husband had buried her. The woman's brother-in-law and daughter were sent for, and they lifted the buried woman out of the rough grave and gave her food. She was sent to the Badnur hospital and lived on for some twelve days longer. The extraordinary part of the story, apart from the callousness and superstition of the husband, is the fact that the poor woman must have lain in the shallow grave, covered with leaves and branches, for six or seven days without food or water. The accused was sentenced to transportation for life.—*King Emperor* v. *Dama Gaiki*, 302 *P. C.*, 1907.

(*b*) **Trial by ordeal.**—In 1900, in a village in Madras, a shoe was lost and the village magician was commissioned to discover the thief. He distributed some powders to the assembled villagers, and immediately after eating the powders two boys were seized with violent vomiting, and one of them died. From his viscera three grains of corrosive sublimate were extracted.—*Mad. C.E. Rept.*, 1900, p. 8.

In Burma, a short spell of organized robbery with assault ('dacoity') and even murder is still fashionable amongst the youth of that country to prove their daring and manhood to their sweethearts, and is thus from its audacious motive to be

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distinguished from ordinary crime, though it might be classed with professional crime.

Intoxicants.—The relatively milder type of the average criminal is perhaps in some measure due to the relative infrequency of alcoholic drunkenness amongst Indians, as alcoholism is found to contribute so largely to hereditary crime in Europe. Amongst the Burmese, where spirits are more freely indulged in, murderous assaults even on near relatives are not uncommon under the influence of alcohol; in Rangoon alone over 300 sword-cuts of the head occur annually, many of them fatal. But the intoxicant mostly indulged in by criminal Indians is *Indian Hemp*, which accounts for some of the most violent tragedies, such as 'running *amok*,' and other maniacal crimes.

Race and Environments.—In so large a continent as India, comprising so many diverse physical features, climates, and races with different social and religious customs, it is to be expected that some of the crimes against the person, and the mode of committing them, should differ somewhat in character in different parts of the country, and be determined to some extent by the different environments of the people.

The softer and less virile people of the enervating plains wreak their spite or vengeance less by personal assaults than by false charges and subtle poison, or, afraid of bodily risk themselves, they hire ruffians to beat or murder their enemy, and scheme deeply to hide their crime; whilst the hardier up-country people and hillmen, taking the law into their own hands, attack openly and slay with their own hands, regardless of personal risk or blame, and are less cunning in concealing their crime. The wilder tribesman lies in wait for the person he believes to have wronged or bewitched him, and on killing his victim, he makes little attempt to hide the body, and usually admits his guilt at once. Certain crimes are confined to certain tribes or castes, such as the poisoning of cattle, especially by *abrus*-seed needles ('*sui*'), which is done by the *chamár* or leather-worker caste with the object of getting cheap hides for their stock-in-trade.

Religion is responsible for several kinds of crime in India. Those '*sati*' murders perpetrated in the name of religion, in which Hindu widows are induced to immolate themselves on the funeral pyre or grave of their husbands, still occasionally occur nearly every year. In 1901 and 1905 cases occurred at Gaya, although it is over eighty years since *sati* was declared illegal by the British Government.[1] Special police

[1] The law against the self-immolation of widows was passed by Lord William Bentinck in 1829.

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precautions have yet to be taken every year to prevent Hindus committing suicide by throwing themselves under the wheels of the idol-car of the god Jagarnath. Female infanticide on account of the religious and social difficulties of marrying daughters still occurs to some extent, especially in Upper India. Abortion and child-murder are most common amongst the unfortunate class of young Hindu widows, for whom re-marriage and social rights are denied by their religion. Amongst Mohammedans sexual crimes are much more frequent than amongst Hindus. Prostitution is much more extensively practised amongst the former, and sexual jealousy resulting in the murder of paramours and favoured rivals is probably the most frequent case of homicide amongst Mohammedans. In Bengal, for example, the greatest number of rape cases are reported from the Mohammedan districts of Mymensingh and Dacca. That fanatical form of homicidal insanity 'running *amok*' is more common amongst Mohammedan fanatics than Hindus.

Domestic characteristics are that women, perhaps more so than in Europe, employ poison rather than bodily violence, and their crime is directed for the most part against their husband, or some rival in his affections; also that domestic quarrels over trifling matters are a frequent cause of suicide in India.

Famine.—Under the stress of hunger in years of famine and scarcity there is a marked increase in such crimes as robbery by violence, and poisoning, homicidal and suicidal.

The foregoing account of the special features of Indian crime, it is hoped, may facilitate our study of Indian Medical Jurisprudence, the wide field of which can be conveniently viewed under the following divisions :—

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PART I.

GENERAL EXAMINATIONS.

CHAPTER I.

IDENTIFICATION OF PERSONS, LIVING AND DEAD.

THE personal identity of the individual in question must be ascertained in all cases which are reported on medico-legally. The medical jurist may also be called upon to establish the identity of a person in cases of suspected foul play resulting in death, and in a great variety of cases, such as alleged assault, rape, disputed sex, fraudulent personation for the purpose of securing property or the prolongation of a lapsed pension, a fraud which is facilitated in this country by the seclusive rights of *pardah nashin* claimed by married women.

Of dead bodies in India it is especially difficult at times to determine the identity, owing to their rapid decomposition by the heat, and their liability to defacement when exposed to the ravages of beasts and birds of prey. On the other hand, the necessity for thorough identification is here all the greater, owing to the custom of rapid burial and cremation, and the occasional practice of supporting a false accusation of murder by causing a person to disappear for a time and bringing forward meanwhile as the body of the missing individual a putrid corpse readily procurable from any river.

In the **routine examination of ordinary** medico-legal cases, it is always well to get the identity of the person or body in question attested by at least two acquaintances, whose name or names should be noted by you in your record, as the personal identity of the individual examined is of such legal importance.

Identification may thus be required of (*a*) a living person, (*b*) a dead body, (*c*) fragmentary human remains, or (*d*) bones only. For this purpose you consider (1) the **sex**, (2)

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age (p. 41), (3) **race** and caste (p. 48), and (4) any characteristic **personal marks** or peculiarities (p. 53).

Sex.

The determination of sex is not usually difficult, as mere inspection of the external genital organs is sufficient to settle most cases otherwise doubtful, without resorting to medical evidence. In cases, however, of suspected murder, where the body is mutilated or only part of it or of the skeleton is available for examination, and in the rare instances of doubtful sex due to malformation where succession to property is concerned, it becomes a much more difficult question, requiring expert evidence, as in under-noted cases. The question of sexual capacity and development also arises sometimes in alleged rape, impotence, etc.

Cases.—(*a*) **Pseudo-hermaphrodite**—Levi Suydam. Suydam presented himself as a freeman, and thus entitled to vote in a contested election. Dr. Barry having found an imperforate penis with a depression in the site of the male meatus, a short urethra opening underneath the penis (hypospadias), and a cleft scrotum with a small but perfect testis in its right half, pronounced him to be a male and entitled to vote. Dr. Ticknor, who objected at first, came to the same conclusion. A few days after it was discovered, by his sister's and his own confession, that Suydam regularly menstruated, and had done so for years. His figure was feminine, the breasts were well developed; and on passing a sound into the urethra, instead of reaching the bladder it passed into a cavity like the vagina, three or four inches deep.—*Amer. Med. Jour. Sc.*, July, 1847.

(*b*) *Æt.* fifty-five at death. General configuration that of a woman (during life celebrated anatomists had formed different opinions as to the sex). At the post mortem there were found, on the right side, a withered testicle, a penis, and a prostate gland; and on the left an ovary, uterus, vagina, and fallopian tube.—Tidy's *Leg. Med*, *I.* 353, case 128.

(*c*) **Female as male.**—Professor A. Powell (Bombay) reports that while he was Resident in Royal Hospital, Belfast, a coal porter, named John Walker, was admitted for a scalp wound infected with erysipelas. "He" had always worked as a porter or dock labourer, and had been married for two years. "He" was found to be a woman with normal vagina and ovaries, but a very large clitoris. At the inquest after "his" death, his "wife" deposed that she had no suspicion "he" was a woman.

(*d*) "A person affected with hypospadias was married for twenty years, and during all that time was treated as a female. Sexual intercourse was regularly effected by the canal of the urethra, nor was it until the period just mentioned had elapsed, that it was discovered that the individual was a man."—Ogston, *Med. Jur. Lect.*, p. 52.

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(*c*) **Male as female.**—In 1905, Dr. W. Hind reported case of "Miss X.," aged 37, who had two solid inguinal tumours, which she asked to be removed on account of their having become painful through the prolonged standing her occupation involved, and the microscope revealed a *testicular* structure in both. She was 5 ft. 4 ins. in height, and 8 st. 3 lbs. weight, and feminine in appearance and habits; soft voice, with long hair, none on face, well-developed breasts, female external genitalia, but no vagina. She never menstruated, and has four sisters like herself, who have no trace of a vagina, and have never menstruated.—*Trans. Med. Leg. Soc.*, *II.* 117.

A remarkable instance of concealed sex was the case of Dr. James Barry, an army surgeon, who rose to the rank of Inspector-General of Hospitals, and after death was discovered to be a female.

Sex of the Living.—This question may arise in connection with malformed infants where property is left to an heir of a specified sex, though what is the characteristic in law of a male is open to discussion.

Thus in entailed property with succession in the male line, if a widower with no son but a daughter marries again and has only a daughter, his property would be divided equally between the two daughters, unless a male child had been born to either wife, when even if it lived only half a minute the whole of the property would go to the sister of this male infant as heir of her brother (*possessio fratris*).

At a later age this question may occur with reference to malformed individuals as to their (1) education whether as a boy or girl, (2) marriage as a man or woman, or (3) right to vote as a man.

In such cases the sex may be very difficult to determine. No definite rules can be laid down; each case must be decided on its own merits, following the legal rule that the individual is to be of that sex which most predominates.

Essential tests of sex in adults.—These are—

1. Possession of a *testicle* accompanied by emissions of fluid containing spermatozoa—that is the strongest possible evidence of a male (but see case of Catherine Hohmann, p. 39).
2. Possession of an *ovary* accompanied by periodic hæmorrhages from an opening about the genitals is the strongest evidence of a female. The uterus, vagina, and breasts are merely incidental appendages.
3. In the absence of the above two characters, the presence of a *uterus* or a second opening behind that leading into the bladder indicates a female.

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4. The general configuration of the body when it agrees with these local indications may be considered confirmatory evidence, but if it disagrees it should be disregarded.

Local examination should include, as far as possible, the internal genitals by bimanual and rectal palpation if necessary.

In infants a consideration of the morphology and development of the sexual organs is of assistance, as these abnormalities are due to faulty development in the fœtal stage during the differentiation of the sexes.

In the normal female there is, so to say, an arrest of development in the middle line below the genital tubercle or clitoris, the homologue of the glans penis, thus forming the entrance to the vagina, and the lateral cutaneous folds do not coalesce but remain separate and form the labia majora. In the normal male the genital folds meet and coalesce in the middle line below to form the scrotum and corpora spongiosa and cavernosa and above to close over the urethra as far as the glans to form the penis. If the genital folds do not unite, the urethra of the male remains open, constituting *hypospadias*, which simulates to some extent the female organs, especially if the testicles have not descended. If in the female there be excessive lateral union and growth of the clitoris the condition may stimulate the male.

The chief homologous parts in the male and female are:—

Male.	*Female.*
Glans penis	Clitoris.
Prepuce	Nymphæ.
Scrotum	Labia majora.
Sinus pocularis	Uterus.
Vas deferens	Ducts of Gaertner.
Gubernaculum testis	Round ligament.
Testicle	Ovary.

The abnormal variations arising from faulty development in these organs which may mask the sex are divisible into:—

True Hermaphrodites	Where the internal sexual organs of both sexes are present.
False Hermaphrodites or *Pseudo-Hermaphrodites*	Where the abnormalities are confined to the external organs:— *Androgyni*, or womanly men, whose male organs resemble those of the female. *Androgynæ*, or manly women, whose female organs resemble the male.

Androgyni have, as the most common condition, *hypospadias*, so called from the urethra opening below the small imperforate penis. In *epispadias* there is deficiency of the anterior wall of the bladder, so that the ureters open externally above the short imperforate penis. In both of these conditions the testicles may not have descended or may exist as a tumour in the groin (*cryptorchid*). In *Androgynæ* it is usually a case of enlarged clitoris with a prolapsed uterus, the fissure of which is transverse, whilst that of the penis is vertical. In such cases, if

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menstruation is found, it is a female; if a testicle or seminal emissions, it is a male.

'True' Hermaphrodites.—The old myth attributed to these beings the possession of organs of both sexes with the power of self-reproduction. No individual with such powers has ever been known to exist. This name, however, is still applied to those individuals who possess certain of the genital organs of both sexes. In the remarkable case of Catherine Hohmann, she had the sexual instincts both of a male and a female, she menstruated periodically and had seminal emissions containing spermatozoa.[1] (See also *Case b*, p. 36.)

This so-called 'true' hermaphrodism has been divided by Sir J. Y. Simpson[2] into: Lateral.—Testicle on one side and ovary on the other. Transverse.—External organs male and internal female or the reversal. Vertical or double, of three varieties.—(*a*) Ovaries with combined male and female passages; (*b*) Testicles with combined male and female passages; (*c*) Ovaries and testicles co-existing on one or both sides. The 'lateral' is considered by Watson to be the only true kind of hermaphrodism, while (*c*) ought probably to be classed amongst double monsters.

In addition to the local examination the following general characteristics should be considered:—

General sexual characters in adult:—

1. General configuration of the body. The shoulders are generally less wide than the hips in females, the reverse in males. The breasts much more developed in females.
2. Hairiness of face and pubes after puberty is greatest in males.
3. Voice is deeper in tone in male, and the *pomum Adami* more prominent.
4. Sexual instinct is assumed to be towards the opposite sex, although there are recorded instances of sexual indulgence of an inverted character (see 'Sodomy,' Chap. XVII., Unnatural Crimes).

Sex of the Dead.—When the entire body is available for examination there will be no difficulty in the great majority of cases in determining the sex, and in doubtful cases of malformed organs dissection will at once reveal the true sex. Any question with regard to the sex of a dead body usually arises when only mutilated fragments of a body or only bones are available for examination. For the identification of such bones the text-books on general anatomy should be consulted.

Sexual characteristics of the skeleton *in the female*:—

1. The *bones* are smaller, thinner, and lighter, and muscular attachments less prominent than in the male.
2. The *pelvis* is *shallower* and *wider* than in the male, which is deeper and narrower. The ilium is more expanded, sacrum more concave than the male (where it is straighter), the symphysis shorter, pubic arch wider, with edges more diverted, foramina more triangular and outlets larger than in the male.
3. The *ribs* have a greater curvature than in the male.

[1] *Med. Times and Gaz.*, June 28, 1873, and *Am. Journ. Obstetrics*, 1876, p. 615.

[2] Todd's *Cyclop. of Anatomy*.

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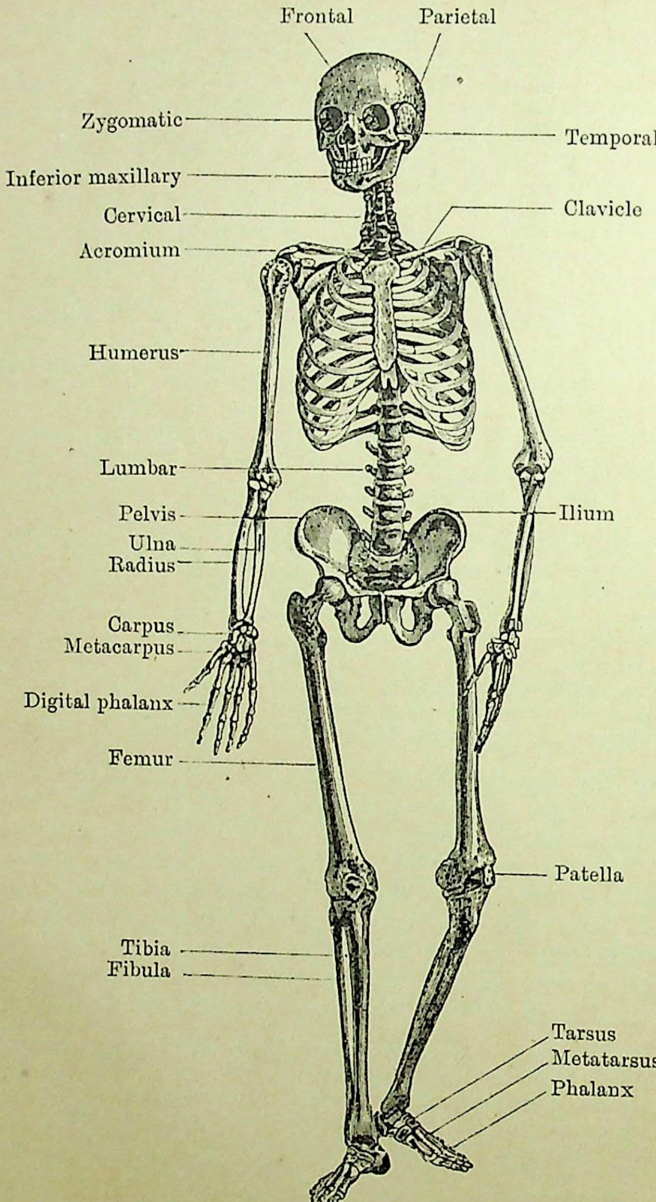


FIG. 1.—Human Male Skeleton.

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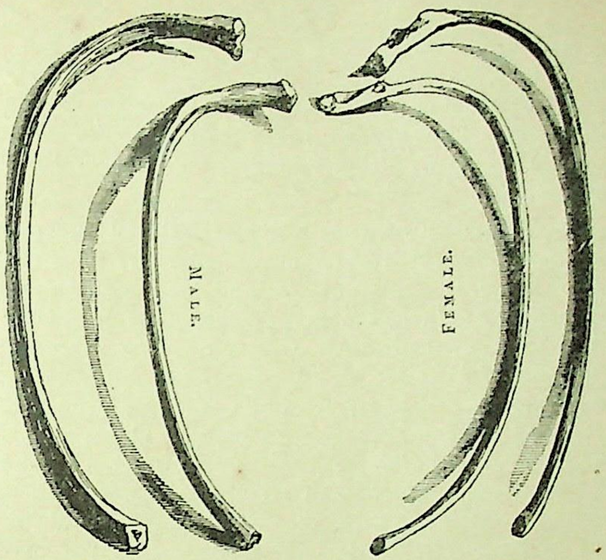


FIG. 2.—Curvature of Female Rib *v.* Male.

The average measurement of the bones (see Fig. 1) in each sex, for Europeans, are here detailed :—

MEASUREMENTS OF BONES AT DIFFERENT AGES (IN INCHES).[1]

Age.		Height.	Spine.	Circumference of skull.	Humerus	Radius.	Hand.	Femur.	Tibia.	Foot.	Pelvis. Transverse diameter of	Pelvis. Antero-posterior.
At birth		19	7·0	15·0	3·5	2·5	3·1	4·3	3·5	3·5	1·3	1·3
2 years (average) ..		27	8·5	17·7	4·7	3·6	3·1	6·2	5·1	3·6	2·2	2·2
4 to 6 years (average)		35	11·8	18·0	·6·6	4·8	4·1	9·1	7·1	5·1	2·5	2·5
8 to 12 years (average)		43	12·8	18·8	8·3	6·0	5·1	11·4	9·4	6·4	3·1	3·1
15 years ..	Female	55	17·0	19·0	10·3	7·0	5·8	14·8	11·0	7·8	4·0	3·6
	Male ..	54	16·5	19·0	10·5	7·5	5·6	15·0	11·5	—	—	—
	Average	54	16·6	19·3	10·4	7·4	5·7	14·8	11·6	8·0	3·8	3·6
18 to 19 years	Female	59	19·0	19·5	11·0	8·2	6·5	16·0	12·8	8·0	5·0	4·8
	Male ..	59	17·5	20·4	11·0	8·5	6·3	15·0	13·0	8·0	3·9	3·8
	Average	60	18·5	19·8	11·4	8·6	6·6	15·5	13·3	8·3	4·7	4·5
Adult European (average)		65	22·2	20·5	12·7	9·2	7·3	17·88	14·4	10·6	5·2	4·3

[1] From Dr. Humphrey, *The Human Skeleton.*

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Age. (2).

The determination of age may be required for the identification of an individual, living or dead, as well as for the question of criminal or civil responsibility in regard to marriage, fecundity, rape, viability in relation to infanticide, making wills, capability as a witness, employment under the Indian Factory Act, etc.

Age in criminal responsibility.—Children under the age of seven are deemed incapable of committing an offence. Children between the ages of seven and twelve in India (seven and fourteen in England) are only deemed capable of commiting offences if they have attained a certain degree of maturity of understanding (*I. P. Code, ss.* 82, 83). Sexual intercourse with a girl under the age of twelve in India is 'rape,' even if the girl consents or is the individual's own wife (*I. P. Code, s.* 377, see also 'Rape'). In England sexual intercourse with consent is a felony up to the age of thirteen, and between the ages of thirteen and sixteen, is a misdemeanour and punishable as such.[1] In India, however, the law is in practice assimilated to that of England, by the prosecution, when failing to prove a child to be under 12, often indicting the accused under *s.* 361, *I. P. C.*, for 'enticing' or 'kidnapping,' or under *s.* 373 for "buying, hiring or otherwise obtaining for prostitution or any unlawful or immoral purpose," or under *s.* 373 for "selling, letting to hire or otherwise disposing of any minor under sixteen," which make connection with a girl under sixteen an "offence"; and then the surgeon has to inquire whether the girl be under or over sixteen. Only a person over the age of twelve can give a valid consent to suffer any harm which may result from an act done in good faith, and for the sufferer's benefit (*I. P.C., s.* 90); and in cases where the act does not come within this description, the consenting individual must be at the age of eighteen or more, for his consent to be valid (*I. P. C., s.* 87).

Age-capacity to contract marriage.—According to the law of England, females under the age of twelve, and males under the age of fourteen, cannot contract marriage. In India consummation of marriage is illegal under the age of twelve, see above.

Attainment of majority.—In England majority is attained at twenty-one. Persons under this age are minors. A minor cannot make a valid will, cannot alienate his goods by deed, cannot be called upon to serve on a jury, etc. Certain

[1] *Criminal Law Amendment Act*, 1885 (48 & 49 Vict. c. 69). Section 7 of this Act also makes it an offence to abduct an unmarried girl under eighteen with intent that she should be unlawfully and carnally known by any man.

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cases excepted, persons domiciled in British India attain majority on completion of their eighteenth year, except when under a guardian appointed by a court or under a Court of Wards, when the individual does not attain majority until completion of twenty-one years of age (Act IX. of 1875, s. 3). Legally an individual attains a given age on the first minute of the day before his birthday, *e.g.* an individual in England who, popularly speaking, will be twenty-one on the 3rd of May, will legally cease to be a minor at the end of the last minute of the 1st of May.

Eligibility for employment under the Indian Factory Act.—In England, in factories children under eight may not be employed, and children between eight and thirteen may only be employed for six and a half hours per day; and only males and females, between thirteen and eighteen, may be employed for sixty hours per week. The Indian Factories Act (XV. of 1881) provides that, in factories coming under its operation, no child under the age of seven shall be employed, and that children between the ages of seven and twelve shall not be employed for more than nine hours per day, and shall have one hour daily for rest, and four holidays per month.

Mode of Estimating Age.

The chief data for estimating the age of an individual are—(1) the teeth, (2) height and weight, (3) hair and breast development, (4) degenerative changes, (5) extent of ossification.

In the Living, age can only be estimated with any degree of certainty in the young. After adult life is reached, the age is only to be guessed at approximately, in the absence of a regular certificate of birth or a horoscope. The points to be noted are:—

(1) **Teeth.**—These yield indications of age up till the thirteenth or fourteenth year, and with the 'wisdom teeth' up to the eighteenth year. The *temporary* or 'milk teeth' usually appear in the following order:—

TEMPORARY OR MILK TEETH ERUPTION.

Eruptive Order.	Name.	Age.
1	Lower central incisors	6th to 7th month
2	Upper ,, ,,	7th to 8th ,,
3	Upper lateral ,,	7th to 9th ,,
4	Lower ,, ,,	10th to 12th ,,
5	1st temporary molars	12th to 14th ,,
6	Canines	17th to 18th ,,
7	2nd temporary molars	2nd year (often later)

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In certain weakly children, especially those suffering from rickets, the dentition may be delayed, while in syphilis the teeth may be premature, and even present when the child is born.

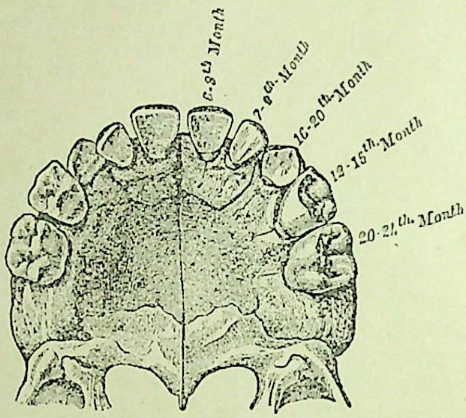


FIG. 3.—Temporary Teeth (upper jaw).[1]

The *Permanent* Teeth are thirty-two in number, 16 in each jaw. The following table by Professor A. Powell, while the police-surgeon of Bombay, gives the order of their appearance for India according to a very large series of observations by him.[2]

	Powell, for natives of India.	Saunders.	Pedley.	Gray.	Mann.
	year	year	year	year	year
First molar ..	6th to 7th	8th	6th	7th	7th
Central incisor	7th	9th	7th	7th	8th
Lateral ..	8th to 9th	10th	8th	8th	9th
Canine ..	10th to 13th	13th	11th to 12th	11th to 12th	11th to 13th
Anterior pre-molars or bicuspid ..	9th to 10th	11th	9th	9th	10th
Posterior pre-molars ..	10th to 12th	12th	10th	10th	11th to 15th
Second molar	11th to 12th	13th to 15th	12th	12th to 13th	13th to 16th
"Wisdom" ..	14th to 27th	18th to 25th	17th to 25th	17th to 21st	18th to 30th

In natives of India a few exceptions may be found to these figures, but these exceptions will be found on the precocious side, rarely at later dates.

Generally, a child of nine should have 12 permanent teeth; at ten or eleven, 24; at thirteen or fourteen he will have 28.

[1] From Macalister's *Human Anatomy*.

[2] *I. M. G.*, 1902, p. 230.

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In a case at Chingleput, Madras,[1] the age was decided wrongly to be between twelve and thirteen because the permanent second molar teeth were ready to come through. In advanced

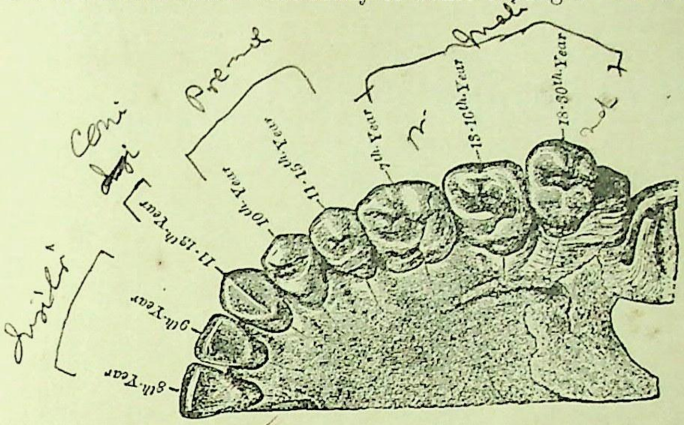


FIG. 4.—Permanent Teeth.[2]

life the teeth become worn down and discoloured, and more or less are lost.

Dr. Powell notes that :—The first molars appear with great regularity in the sixth or seventh year. Of forty-one children, aged seven, all had their first permanent molars. The central incisors appear during the seventh, the lateral at the eighth or ninth year. All nine-year-old children, natives, Jews and Parsis, had all the incisors permanent. Of ten Europeans aged nine, one girl had not shed her lateral milk incisors. The canines showed greater variation in the time of eruption. They usually appear during the eleventh or twelfth year. I have seen permanent canines in a child of nine. The anterior bicuspids appear in the ninth or tenth, the posterior from the tenth to the twelfth year. The second molars come with great regularity in the eleventh or twelfth year. They may appear earlier, but *I have never seen a Hindu or Mussulman child of twelve without second molars.* I have seen two Parsis, aged $12\frac{1}{4}$, without permanent second molars. I have seen wisdom teeth in Hindu children aged $13\frac{2}{12}$, $13\frac{4}{12}$, and $13\frac{9}{12}$. A few extraordinary irregularities may be found, but such freaks do not invalidate the general rules. I have known a European cut a wisdom tooth at thirty-six. Ackery quotes a case of temporary molars retained at 63, and Salter quotes a case of the same teeth being retained at 65.

To distinguish the permanent from the deciduous or temporary teeth is not always easy. Professor Powell gives the following directions :—

Taylor says the milk teeth are smaller than those that replace them. How is the surgeon to compare? This is not true of the deciduous molars. These are usually larger than the bicuspids which replace them.

[1] J. Short, *Madras J. Med. Sc.*, 1862, p. 227.
[2] From Macalister's *Human Anatomy.*

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The anterior milk teeth are vertical, the permanent are usually inclined somewhat forward. The crowns of the milk teeth are of a white, china-like colour as compared with the ivory white of the permanent. The junction of the crown with the fang of the milk tooth is often marked by a ridge which is not seen in the permanent. 'Mercurial' teeth and Hutchinson's teeth must be of the permanent set.

2. **Height and weight.**—There are no special Indian observations on the relations of height and weight to age. The following table is based on data in England, where the average height is slightly more than in India.

Males.			Females.		
Age last birthday.	Height. ft. in.	Weight. st. lb.	Age last birthday.	Height. ft. in.	Weight. st. lb.
1	2 9½	— 18½	1	2 3½	—
2	2 9¾	2 4½	2	2 8¼	1 11¼
3	3 0¾	2 6	3	3 0¼	2 3½
4	3 2½	2 9	4	3 2¼	2 8
5	3 5	2 12	5	3 4½	2 11
6	3 8	3 2½	6	3 6¾	2 13¾
7	3 10	3 7¾	7	3 8½	3 5½
8	3 11	3 13	8	3 10½	3 10
9	4 1¾	4 4½	9	4 0¾	3 13½
10	4 3¾	4 11½	10	4 3	4 6
11	4 5½	5 2	11	4 5	4 12
12	4 7	5 6¾	12	4 7½	5 6½
13	4 9	5 12½	13	4 9¾	6 3
14	4 11¼	6 8	14	4 11¾	6 12¾
15	5 2¼	7 4¾	15	5 1	7 8¼
16	5 4¼	8 7	16	5 1¾	8 1
17	5 6¼	9 5	17	5 2½	8 3½
18	5 7	9 11½	18	5 2½	8 9
19	5 7¼	9 13½	19	5 2¾	8 12
20	5 7½	10 3¼	20	5 3	8 11½
21	5 7½	10 5	21	5 3	8 10
22	5 7½	10 7	22	5 2¾	8 11½
23	5 7½	10 7½	23	5 3	8 12
24	5 7¾	10 8	24	5 2¾	8 9
25-30	5 7¾	10 12¼	25-30	5 2	8 8
30-35	5 8	11 6	30-35	5 1	8 9

The weight slightly diminishes in old age. English children attain half their adult weight at about 12 in case of boys, and under 11 in case of girls; as in this table.[1]

	Males.		Females.	
Age.	Height in inches.	Weight in lbs.	Height in inches.	Weight in lbs.
8 years	46·66	55·08	46·73	52·82
9 ,,	49·21	60·02	48·63	56·53
10 ,,	51·00	65·29	50·07	61·19
11 ,,	52·87	71·01	53·66	68·00
12 ,,	54·05	75·00	54·41	75·95

[1] Dr. Bridges, *Memo. on prison diets*, calculated from children in non-factory districts.

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The average weight of Indian children at birth has been estimated at 5½ lbs.[1]; that of English children at birth at 6½ lbs., and during the first year after birth about one pound is gained each month.[2] Of adults the average height and weight in the majority of Indian races is lower than that of Europeans. Buchanan gives the average weight of a Bengali at 109 lbs. Lewis gives under 110 lbs. as the average weight of N.-W. Provinces men. Buchanan's formula for calculating the weight for the height is: Taking 5 feet as equal to 100 lbs., add 3 lbs. in weight for every full inch above that, *e.g.* 5 ft. 6 in. = 100 + 3 × 6 = 118 lbs. In men over 5 ft. 8 in. add 4 lbs. for each inch.

For Europeans.—Average height, without shoes, and average weight, with clothes, of all classes (town and country) of the general population of Great Britain (from the report of the Anthropometric Committee, 1883). This table shows: (1) Growth is most rapid during the first five years of life, the *rate* of growth being about the same in both sexes, girls being a little shorter and lighter than boys. (2) From 5 till 10, boys grow more rapidly than girls. (3) From 10 to 15, girls grow more rapidly than boys. At 11½ to 14½ they are actually taller, and from 12½ to 15½ actually heavier than boys. (4) From 15 to 20, boys begin again to increase more rapidly than girls, and complete their growth at about 23. (5) After 15, girls grow more slowly, and practically reach their full height and weight at 20. During childhood and adolescence increase in weight is more marked in the winter, and increase in height in the summer.

3. **Hair** on pubes and armpits. This growth begins about ten or eleven years of age, and in boys about fifteen to eighteen is attended by deepening of voice.

4. **Breast development** in girls.—This varies greatly in time. In native girls the average age of puberty is twelve to thirteen (see Chap. XI.). But even women of twenty sometimes have not menstruated; and Dr. Powell cites a case of a child, aged four, who had a discharge of blood from the vagina every six or eight weeks, and the labia were large, and the breasts as large as the halves of a moderate size orange.[3] It is accepted as a good defence in England in cases of alleged rape when consent is admitted or proved that the judge or jury is satisfied that the girl looks sixteen, and might have been supposed by the accused to be sixteen years of age, irrespective of her actual age.

5. **Degenerative changes.**—Wrinkles, grey hair, *arcus senilis*, which is rare before forty, change in angle of the lower jaw. The angle of lower jaw, which is obtuse in infants, becomes

[1] Harvey, *loc. cit.* [2] According to Tidy. [3] *I. M. G.*, 1902.

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nearly a right angle in young adults, and in advanced old age becomes again obtuse and shallow, through absorption of the alveolar portion.

5. **Ossification.**—Although this is less easily and certainly observable in the living than in the dead, the *Roentgen rays* enable it to be observed in the former, and it is of especial importance in charges complementary of rape where the surgeon has to inquire whether the girl be under or over sixteen.

For points of Ossification see table. The epiphysis at the knee-joint unites at the sixteenth year and not the seventeenth to the twenty-fourth as stated in the anatomy books.[1] The external condyle of the humerus about 13th or 14th year.[2] Internal condyle 17th or 18th year; olecranon, 16th year.[3] Head of the radius *unites with the shaft* about the 13th to the 15th year. The centres of the acromion, the border and lower angle of the scapula, two in the coracoid process appear between the ages of fourteen and sixteen. These latter are difficult to observe by the X-rays. The pisiform bone in children over twelve usually shows ossification. Its absence is strong evidence that the child is under twelve.

Age in the Dead.—Here, in addition to the foregoing points regarding dentition and height-weight, it is possible to make more extensive use of an examination of the bones for that other precise criterion of age—**the progress of ossification,** as in Ogston's table on next page.

It should be noted that:—

(1) Ossification appears in the following epiphyses at the ages stated *in years.* Before the end of the 2nd, in the heads and lower epiphyses of the humerus, femur, and tibia, and in the lower epiphyses of the ulna, radius, and fibula. At 5 in the upper epiphysis of the fibula, at 7 to 9 in the olecranon, and 8 to 10 in the upper epiphysis of the radius.

(2) Ossification appears in the bodies of the following bones at the ages (stated in years). At 2½, patella; at 3, cuboid; at 4, trapezoid and second and third tarsal cuneiform; at 5, semilunar and carpal scaphoid; and at 12 in the pisiform bones.

(3) Bony union takes place at one year, of the posterior arches with the bodies of the vertebræ, and of the three portions of the temporal bone. At 3 years, of the odontoid process with the axis; at 4 years, of the styloid process with the temporal bone; at 6 years, of the ascending and descending rami of the pubis; at 9 years of the three portions of the os innominatum in the acetabulum; at 15 years, of the last four sacral vertebræ, and of the coracoid with the scapula; at about 25, all the epiphyses have united; and at 25 to 30, the first sacral vertebra unites with the others.

(4) *As age advances* the rib and laryngeal cartilages become ossified and the skull becomes thinned by absorption of diploe.

The above directions apply also to fragmentary portions of

[1] Dr. Carl Beck, *Journ. Amer. Med. Ass.*, 5th January, 1901.
[2] Quain: Dr. A. Powell gives 16th to 17th year.
[3] Dr. A. Powell, *loc. cit.*

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a body or skeleton, in regard to which consult Dr. Humphrey's table on p. 41, from which the age may be approximately estimated from isolated bones.

THE PROCESS OF OSSIFICATION.

Age after birth.	Points of ossification appear in	Bony unison occurs between
4 months	Cornua of hyoid.	—
5 ,,	Cornicula of hyoid.	—
6 ,,	Anterior arch of atlas.	Alæ majores and body of sphenoid.
1 year	Lower end of humerus; heads of humerus, femur, and tibia; 1st cuneiform bones.	Posterior arches and body of vertebræ; portions of the temporal bone, except styloid process.
2 years	Lower ends of radius, tibia, and fibula; ends of metacarpal and metatarsal bones.	—
2½ ,,	Patella, lesser tuberosity of humerus and four smaller metacarpal bones.	—
3 ,,	Cuboid and large trochanter.	Odontoid and axis.
4 ,,	Trapezoid; 2nd and 3rd cuneiform.	Styloid process and temporal bone.
5 ,,	Semilunar; carpal scaphoid; head of fibula; ends of finger bones.	Rami and body of vertebræ dentata.
6 ,,	Proximal epiphyses of four smaller toes.	Rami of pubis and ischium.
7 ,,	Trochlea of humerus.	—
7 to 9 ,,	Olecranon and scaphoid.	The two bony points at head of humerus.
9 ,,	—	Three portions of os innominatum.
12 ,,	Pisiform.	—
14 ,,	Neck and lesser trochanter of femur.	—
15 ,,	Inferior angle of scapula.	Last 4 sacral vertebræ; coracoid and body of scapula.
15 to 20 ,,	Sternal end of clavicle, coccyx.	Shaft of femur and its epiphyses; humerus and its epiphyses.
18 to 23 ,,	—	Sphenoid and occipital; tibia and its epiphyses; 1st and middle portions of sternum; epiphyses and body of ribs.
25 to 30 ,,	—	First sacral vertebra and rest of sacrum.

Race and Caste.

It is not often that this requires to be proved, but the question might arise with reference to the dead bodies of unknown persons. Certain externals of dress and conventional

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markings serve to distinguish Hindus generally from Mohammedans. The chief of these are here tabulated :—

	Mohammedans.	Hindus.
Males.	1. Circumcision marks, over 11 years of age.	1. Not circumcised.
	2. Ears not pierced, or only one.	2. Both ear lobes pierced.
	3. Crown entirely shaved.	3. Hair tuft retained when crown shaved.
	4. Callosities from prayer attitudes on forehead, tip of l. ext. malleolus patella, tuberosity of l. tibia.	4. None.
	5. Palm of l. hand and tip of little finger occasionally stained with *henna*.	5. Not so.
	6. Chapkan coat fastened on left side of chest, and may show sunburnt mark.	6. Chapkan opens on right side.
	7. No sacred thread.	7. Sacred thread in higher castes over left shoulder.
Females.	1. Not tattooed, especially between eyebrows.[1]	1. Tattooed between eyes and inside wrist, especially lower castes.
	2. Ears pierced numerously along helix with silver rings.	2. Ears pierced in few places.
	3. Nose-ring through septum.	3. Nose-rings through left ala.
	4. Shoe marks probable.	4. Shoes not worn, toes widespread.
	5. Palm, soles and nails tinted with brown *henna* or *mehindi*.	5. Stained with carmine *aultha*.
	6. Sari worn double.	6. Sari worn single by married, except in E. Bengal.
	7. Trousers usually.[2]	7. No trousers.
	8. No vermilion or hair-parting.	8. Vermilion on hair-parting in married.
	9. No iron-wristlet.	9. Iron-wristlet on left wrist in married in Bengal.

The best test of race is found in the measurements of the head, and of these the easiest to take and one of the most important is the *cephalic index*. This is the ratio between the maximum length and maximum breadth of the skull, thus: $\frac{\text{Breadth transversely} \times 100}{\text{Antero-posterior length}}$ = Cephalic Index. A skull is '*dolicho-cephalic*' or '**long**-headed' when this index is between 70 and 75·9, '*mesaticephalic*' or '**medium**' long-headed from 75 to 79·9, and *brachy-cephalic* (the Mongolian type) or '**round**'-headed from 80 upwards. The skull of the fair Anyans and the dark aboriginal Dravidian tribes are both 'long-' or 'medium long-'

[1] Except proselytized Bengali Mohammedans.
[2] A Parsi woman wears trousers and sacred thread around waist like male Parsis.

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headed; but in the case of the Anyan, or type in which the Anyan blood predominates, the long-skull is broad-browed, whereas the Dravidian, though also long and usually relatively longer than the Anyan, is narrow-browed. Thus, whilst Rajputs, Brahmans and Kayasts of Bengal have skulls with a cephalic index averaging respectively 76·7, 78·7, 78·2, and Dravidian tribes and castes average 74·8 to 78, in the former case the brow is broad, giving a wider skull with larger brain in comparison to the narrow skull of less brain capacity of the Dravidian and Dom.

Racial differences in skeleton.—Sir R. H. Charles, I.M.S., has shown[1] that it is possible to differentiate Oriental from European skeletons by means of peculiarities in the vertebral column, pelvis and lower extremities, the result of changes in the bones brought about by the different modes of sitting. The Oriental in India sits habitually in a squatting posture on the ground, or on a cushion, and not on a chair. His body, when thus seated, leans much more forward than in the chair position of the West, and the effect of this habit during many centuries has been to cause an alteration in the bones.

The importance of being able to distinguish the skeleton of a European from an Indian may be useful at times, such as when a British soldier has disappeared from cantonments, and a skeleton is brought forward which is believed to be that of the missing man.

Spinal Column.—As a rule the body of a Punjabi lumbar vertebra is *thicker behind than in front* . . . and as the type matures with age, the excess of the posterior over the anterior becomes more pronounced. In the female only is the anterior measurement greater than the posterior. The total posterior diameter of the five lumbar vertebræ, I have found exceeded the anterior by 19 mm. in one case. Generally the difference is 8 mm. in favour of the posterior. Amongst European skeletons, Sir William Turner states there is a variance of 5·6 mm. in favour of the *anterior* surface. The 5th lumbar vertebra is only exceptionally wedge-shaped as in the European. Up to the age of 12 years none of the typical changes have taken place, and it is probable they occur in the epiphysial area, and that it progresses from puberty to 25 years of age eventuating in the fact that the *deepest* part of the centrum of a lumbar vertebra is behind, and not as in the European in front.

The lumbar curve is straight or very slightly convex. The mean general lumbar index of some recent vertebral columns I found to be 106·8. Sir Wm. Turner quotes 96 as the index for the European lumbar curve. The accessory processes of the 5th *lumbar* are frequently very largely developed, and often articulate with the alæ of the sacrum.

[1] The identification of European and Oriental skeletons by Major R. H. Charles, I.M.S., *Ind. Med. Congress Trans.*, Calcutta, 1894.

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The auricular surface of the sacrum I found in 78·7 per cent. to be formed of only two vertebræ, the first and second. European sacra have this surface formed from three vertebræ, according to Professor Macalister.

Acetabulum.—1st, in natives of India the ischial portion of the *facies lunata* is very large. The rim of the acetabulum here is very prominent, the groove for the obturator externus below it is consequently deep.

2nd, in the extension forwards and widening out of the lower horn of the facies lunata whereby the cotyloid notch is, as it were, partly bridged over instead of being an irregular open space. It looks as if the transverse ligament were ossified on its ischial side.

3rd, the cotyloid notch, which in the European os innominatum is as a rule open, presents in all well-marked Indian bones the characteristic of being arched over by the forward and upward prolongation of the inferior cornu of the facies lunata. The superficial boundary of the cotyloid notch in the European consists of the transverse ligament alone; the same boundary in the Indian consists of bone (part of the ischium) plus the transverse ligament.

Head of the Femur.—The articular area is of greater extent relatively and absolutely than that of an European bone. The surface is specially prolonged to adapt itself to the modified facies lunata of the acetabulum during extreme flexion and partial abduction, and during semi-flexion and extreme abduction occurring in the hip-joint in the squatting and satorial postures. The **neck of the Femur** is longer relatively than in the European. The upper surface of the internal condyle of the femur is partly articular. This is not so in the European, where it is merely rough for the internal head of the gastrocnemius. It is due to the power of extreme flexion possessed by the Oriental knee-joint.

Head of the Tibia is set on the shaft very obliquely. An Oriental tibia can be easily held by the finger and thumb when the internal tuberosity is grasped behind by them. The upper surface of the internal tuberosity slopes considerably downwards and inwards; it is never flat as in the European bone. The external tuberosity of the tibia has its condylar surface convex from before backwards, and the articular area is well prolonged downwards posteriorly. The upper part of the tibial diaphysis is commonly directed obliquely backwards. On the anterior margin of lower extremity of the tibia, a facet will in the great majority of cases be found on what is the ligamentous area of the European bone. In upwards of 17 per cent. of tibiæ a second facet on the same border, but occupying a more internal position, will be seen. Both these articulate with corresponding articular areas on the upper surface of the neck of the Astragalus.

The Astragalus contrasted with the European differs considerably. The outer margin of the neck is much thinner than in the European bone—markedly so. On the head there is a greater prolongation of the articular surface, both internally and externally relatively to the size of the bone, than in the European specimen. The under surface.—In the European bone the deep concavity or articulation with the large convex facet on the upper surface of the os calcis is bounded generally by two sharp non-articular margins. In Oriental bones the outer margin is frequently articular on its inferior aspect, as this part, when the facet exists, articulates with the upper surface of the greater process of the os calcis.

The Skull.—For practical purposes it may be assumed that most male Indian skulls, certainly those of the lower castes, have a cubic capacity

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of 1360 c.c. or under, whereas European male skulls run from 1500 c.c. and upwards. The measurement of the cranial cubic capacity is easily taken with mustard seed, which is procurable in any bazaar [though the use of small shot, as in Europe, is better, especially if the skull is wet or dirty].

Bones generally.—Some points assigned by authorities as differentiating European and Asiatic skeletons are to be used with caution :—

1st.—The bones of the Oriental are smaller. It is generally so, but not always. 2nd.—The skeleton of the Oriental is lighter. An adult male European skeleton weighs about 10 lbs. 6 oz., the female weighing 8 lbs. 13 oz. A skeleton of a Panjabi weighing 12 lbs. 3 oz. is exceptional. The rule holds truer for *female* skeletons. An average Panjabi female weighs about 6 lbs. 2 oz. There is a greater difference in weight and stature between the Indian female and the European female than there is between the males of these races.

Birth-mark as Test of Race.—The presence of blue irregular patches on the lower sacral region of infants is alleged by Baelz to be exclusively found amongst persons of Mongolian race. Extensive inquiry by the Indian Government during the census of 1911 elicited that the 'Mongoloid patch' is almost universal amongst the Burmese who are typically Mongolian—the colour is generally dark blue, but varied from dark brown or reddish to pink (Burma Cens. Rept. 1911, 285). It was fairly common in Assam, Bengal, the eastern border of the Upper Provinces and Panjab, where a large leavening of Mongolian blood is known to exist. The Bombay Rept., from observations in maternity hospitals, found the patches in Hindus 25 per cent. in Bombay and 17 out of 19 in Admedabad; Goanese nearly 20 per cent., and infers that while it may be universal in Mongolian races, it is not confined to them exclusively.

Personal Marks or Peculiarities.

These may be *congenital* or *acquired*. Those which admit of being photographed should be so registered.

Congenital.

These are chiefly the features, colour of the eyes, etc., deformities, and finger-prints.

1. **Features.**—Resemblance to parents or family likenesses or to photographic portraits of a missing individual may be important in the case of those claiming to be individuals who have not been heard of for years. In the case of dead bodies, putrefaction rapidly renders the features unrecognizable; in some instances, however, the features have been clearly recognized

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after long interment, *e.g.* in the case of Charles I., whose body was exhumed 165 years after death.

Cases of Disputed Identity.—(*a*) The **Tichborne case.**—At the trial of this case in London in 1874, the main question was whether an individual who claimed large estates was or was not Roger Tichborne. Roger Tichborne was believed to have perished at sea twenty years previously. Some of the witnesses expressed their belief that the claimant was really Roger Tichborne; the majority, however, denied this, and believed he was Arthur Orton, a butcher, of Wapping. The following were some of the main points in the cases:—(1) It was proved that Roger Tichborne had been bled repeatedly from the arms, and once also from the ankles and temple; also that he had tattoo-marks on the left arm. None of these marks were present on the body of the claimant. (2) Comparison of the features of the claimant with a photographic portrait of the true Roger Tichborne showed the following differences: (*a*) The eyes of Roger Tichborne tended upwards from the nose at more than a right angle, those of the claimant tended downwards and therefore at less than a right angle (*see* diagram, Fig. 4A); (*b*) the ears of the

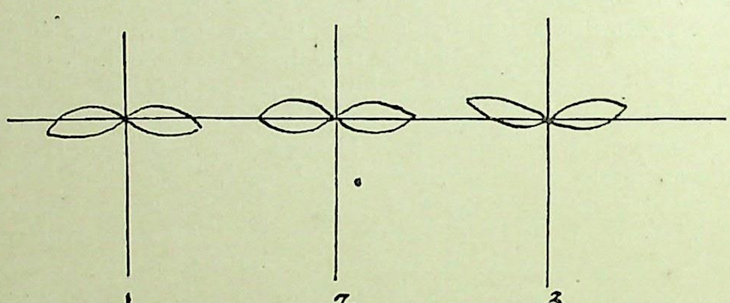


FIG. 4A.—Angle of Eyes in Identity-Cases.

In No. 2 the axes of the eyes form a right angle with a line drawn through the middle of the forehead and nose. In No. 1 it is less than a right angle, in No. 3 more than a right angle.

claimant were about one-third longer than those of Roger Tichborne; (*c*) the central groove joining the nose to the upper lip was much wider in Roger Tichborne than in the claimant. (3) The claimant was acquainted with many of the events in the life of the true Roger Tichborne, apparently picked up from various sources; he, however, (*a*) did not know the Christian names of Roger Tichborne's mother; and (*b*) could neither read nor speak French, although the true Roger Tichborne spoke French fluently.[1]

(*b*) The **Burdwan Case** of Disputed Identity.—Pratap Chandra.—The case of Pratap Chandra, the claimant to the Burdwan Raj, resembled in many respects the foregoing Tichborne case. It was tried in 1838 at Hooghly. The *rāja* of Burdwan at the beginning of last century had an only son, Pratap Chandra, who died in 1820-1821, during the lifetime of his father. Fifteen years afterwards, in 1835, a pretender appeared calling himself Pratap Chandra and claiming the Burdwan estate. He came in the garb of a *sanyasi*, and declared that he had not died as was alleged, but had been living in secret retirement and had now

[1] Guy's *For. Med.*, p. 37.

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returned. His story gained considerable credence, and some of his adherents created a breach of the peace for which he was imprisoned for six months. On release from jail he was provided with funds by some of those who believed in him, and went in royal state with a large following to take forcible possession of the palace, causing a disturbance in the quelling of which three persons were shot by the military. He was indicted for fraudulently assuming the name and title of the deceased *rāja*. The death of the real Pratap Chandra was testified to by the native doctors who treated him, and other persons who saw him die of fever, and who were with the corpse until it was cremated, also the priests who performed the *sradh* ceremonies. The face of the corpse was uncovered and then touched with fire three or more times, and the fire having burned the corpse to ashes in the presence of two or three thousand spectators, it was impossible that the body could escape. The identity of the claimant was rejected by Mr. H. T. Prinsep, Secretary to the Government of India, and several others who had known the Pratap Chandra. Whilst General Allard, Major Marshall, Dr. Scott, Civil Surgeon of Burdwan, Dr. Halliday and others believed he was the real Pratap. The prosecution alleged that he was Kristo Lal, son of a priest, formerly resident of Burdwan. Several witnesses testified to the claimant being the latter person, also the prisoner's voice and manner were quite different from those of Pratap, but his features, especially in the shape of the nose and the colour of the eyes, resembled a picture of Pratap. Major Marshall identified him as Pratap by certain marks, though the nose of the young *rāja*, twenty years before, was "rather fuller and smoother, and the outline not so distinct" as the prisoner's at present. The Danish Governor of Chinsurrah, who was well acquainted with Pratap, identified prisoner as the real prince by certain scars, namely, a slight mark behind the right ear occasioned by the glazed string of a kite. A mark between the shoulders caused by the bite of a vicious horse, a mark on the knee, and a scald mark, the size of an eight-anna piece, on left hand. The prisoner possessed all these marks. The judge held that the case was proved against prisoner and recommended that he be sentenced to three to five years' imprisonment. The High Court (Nizamat) sentenced him to a fine of Rs. 1000 for having assumed the name of Pratap Chandra. He died in obscurity in 1856.—Abridged from *Celebrated Trials*, by J. Goshal, 1902.

(*c*) Martin Guerre's identity.—In the second half of the sixteenth century, Martin Guerre, then a young man of twenty, absconded from his village in Languedoc, under fear of being charged with theft, leaving behind him his young wife and infant son. Martin Guerre, it was afterwards proved, enlisted as a soldier, and became extremely intimate with a comrade of bad character named Arnauld de Tilh (or Dutille). Eight years after Martin Guerre's disappearance from his home, Arnauld de Tilh appeared there, represented himself as Martin Guerre, and was at once accepted as the latter by all Martin Guerre's relatives, including his wife. The impostor, mainly through his having become acquainted with all the true Martin Guerre's secrets, was able to carry on his imposture with success for several years. At the end of that period a quarrel arose between the impostor and Martin Guerre's uncle, when the latter denounced the former, who was put on his trial. At the trial of 150 witnesses, forty swore that the accused was Martin Guerre, and fifty that he was not; the remaining sixty were in doubt. Martin Guerre's wife was quite satisfied that the accused was not an impostor. The trial resulted in the condemnation of the accused. He appealed. The Appeal Court found the evidence so extremely conflicting, that they were inclined to reverse the judgment of the lower Court when

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the true Martin Guerre appeared. Arnauld de Tilh was thereupon condemned, and subsequently confessed his imposture. Some of the points in this case were: (1) The accused "had double eye-teeth in the upper jaw, a scar on the forehead, the nail of the left forefinger sunk in the flesh, and four warts on the right hand—all peculiarities possessed by the true Martin Guerre." In other personal peculiarities, however, the accused differed greatly from the true Martin Guerre. (2) "Martin was a skilled fencer, which Arnauld was not; and Arnauld could not speak even a few words of Martin's native Basque language."—Guy's *F. M.*, 15.

2. **Colour of eyes, skin,** and **hair.**—In some individuals one iris differs in colour from the other. The hair resists putrefaction, hence its colour, etc., may be of special importance in the case of exhumed or greatly putrefied bodies. The colour of the hair may, however, have been altered for disguise or otherwise, *e.g.* darkened, generally by the use of metallic dyes, chiefly lead or silver compounds;[1] or rendered lighter by chlorine or hydrogen-dioxide solution, in which case the roots will be found less altered, and therefore darker than the rest of the hair. The hair is frequently dyed reddish in elderly Mohammedans.

Case.—A portion of a scalp with a tuft of red hair was held to prove the identity of a murdered indigo planter Dick in Nuddea District in 1830.—Chevers, *M. J.*, 60.

3. **Deformities.**—Such as moles, 'birth-marks' (*nævus*), hare-lip, web-fingers or toes, and additional fingers. Birth-marks may be removed by painting with carbonic-acid-ice; in the inflammation resulting the frozen tissue is absorbed, leaving the skin practically normal.

4. **Finger-prints.**—Identification by means of finger-prints has now established its claim to trustworthiness, and has become a most important branch of criminal investigation both for the detection of crime and the identification of the criminal. It has, in the Galton-Henry system, been adopted in India, England, and most civilized countries throughout the world, and has superseded the French anthropometric system of ear-measurement of Bertillon, and it is legalized under the Indian Evidence Act, all emigrants signing contracts under the Emigration Act.

Finger-prints appear to have been first practically utilized for the identification of individuals by Sir W. Herschel, of the Indian Civil Service, who introduced it into the Hugli district of Bengal in 1877 for the purpose of identifying illiterate Indian coolies and the executants of documents for registration, in order to detect false impersonation, which

[1] For the detection of these the hair may be digested in dilute nitric acid, the acid liquid evaporated to dryness, and the usual chemical tests applied to a solution of the residue; or the hair may be incinerated and the metal sought for in the ash (see detection of lead in organic mixtures).

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was prevalent in the law courts.[1] The materials and experience thus gained were utilized by Sir Fancis Galton in 1888, in his scientific study of the subject; but it remained for Sir E. Henry (Inspector-General of Police, Bengal) to take up the Galton formulæ and invent a relatively simple ideal system of classification on a numerical basis.

The Galton-Henry system is now in general use in India as a check against false impersonation in the case of all subordinate pensioners, civil and military, *pardah* or *zenana* ladies, for medical certificates and attestation in many branches of public business, under the undesirable plague regulations, and for Mohammedan pilgrims to Mecca, to prevent the re-employment of discharged men, and innumerable other purposes of identification. Whilst the record is of admitted efficacy for the proof or disproof of identity where the person in question is accessible



A B

FIG. 5.—Finger-print impressions (after Sir E. Henry).

A, '*plain.*' B, '*rolled*' impression of the same finger.

or has given his mark on a previous occasion, no objection can be offered to this method on the score of caste or religion, or rank in society or sex, as there is no prejudice to be overcome in obtaining it.

The persistence of the specific details of the ridges forming the patterns of the finger-markings has been proved by Galton to portend throughout the whole period of the individual life. Those found on the new-born babe are traceable on the fingers of the same person in extreme old age, and are only effaced when decomposition has set in after death. Galton concluded

[1] *Nature*, XXII., p. 605.

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that "there appear to be no bodily characteristics other than deep scars and tattoo-marks comparable in their persistence to these markings."

The characteristic markings on the skin over the balls of the fingers are the curved lines termed *papillary ridges*, not the lines called creases. These ridges are studded with minute pores, the mouths of the ducts of the sweat-glands, which appear on the imprint as fine dotted lines. A cicatrized cut (see Figs. 6 and 7) or deep ulcer leaves a permanent mark,



FIG. 6.—Magnified finger-print, '*Arch*' pattern (after Henry).
N.B.—The white transverse lines across the ridges are cicatrized cuts.

which shows on the paper imprint as a white space or line. These marks have to be distinguished from possible accidental creases in unskilful taking of impressions. In comparing impressions the examiner seeks for similarity or dissimilarity in the type and details of the ridges of the patterns; and if his conclusions therefrom are corroborated by coincident creases his task is so much the easier. The lines or papillary ridges are constant and invariable in the same individual, and no two separate individuals exhibit patterns which exactly or entirely correspond. As, however, single digits of different persons have been found to correspond closely in details, great caution is needed where only a single digital imprint is available for comparison,[1] and it is now customary in criminal cases to take

[1] Dr. Garson, *Trans. Med. Leg. Soc.*, 1906, 16, etc.

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the impressions of all the fingers. A 'rolled' impression, recording the pattern of the whole ball of the finger, is much more perfect and desirable than a 'plain' one (see Fig. 5, p. 57), which is only partial.

Directions for Taking Finger-prints.[1]—Take (1) ordinary white paper not too highly glazed; (2) some ordinary printer's ink; (3) a roller for spreading it, consisting of a wooden cylinder 3½ inches long, one inch diameter, over which a piece of indiarubber tubing has been tightly stretched; (4) a piece of flat tin as a slab; (5) a pointer, which could be a penholder-handle with a needle let in at one end, to count the ridges; (6) a lens to assist in the counting. The ink, roller and slab must be kept

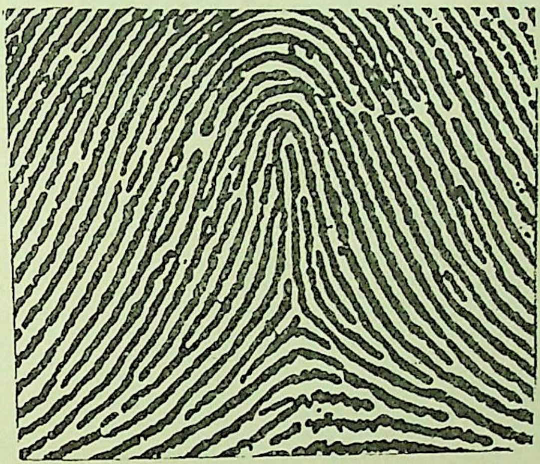


FIG. 7.—Magnified Finger-print, '*Loop*' pattern (after Henry).
N.B.—The white transverse lines across the ridges are cicatrized cuts.

scrupulously clean and free from dust, hairs, or grit; the ink should be kept in a closed bottle, and the roller wrapped in clean, oiled paper, and all old ink wiped off the slab.

For a '*rolled*' impression, the bulb of the finger is placed upon the tin slab, over which the *thinnest* possible film of printer's ink has been spread, the plane of the nail being kept at right angles to the plane of the slab, and the finger is then turned over until the bulb-surface, which originally faced to the left, now faces to the right. By this means the ridge-surface of the finger between the nail boundaries is inked, and, by pressing it lightly upon paper in the same way that it was pressed upon the inked slab, a clear rolled impression of the finger surface is obtained. Care must be taken to have a very small quantity of ink in the thinnest film, not to press the finger too heavily on the inked slab, or subsequently too heavily on the paper, otherwise a blurred or imperfect impression results. A '*plain*' imprint is obtained by placing the bulb of the finger upon the inked slab, and then impressing it on the paper without any turning movement.

[1] For full details see *Classification and Uses of Finger-prints*, by Sir E. R. Henry, 4th ed., London, 1913, 20, etc.

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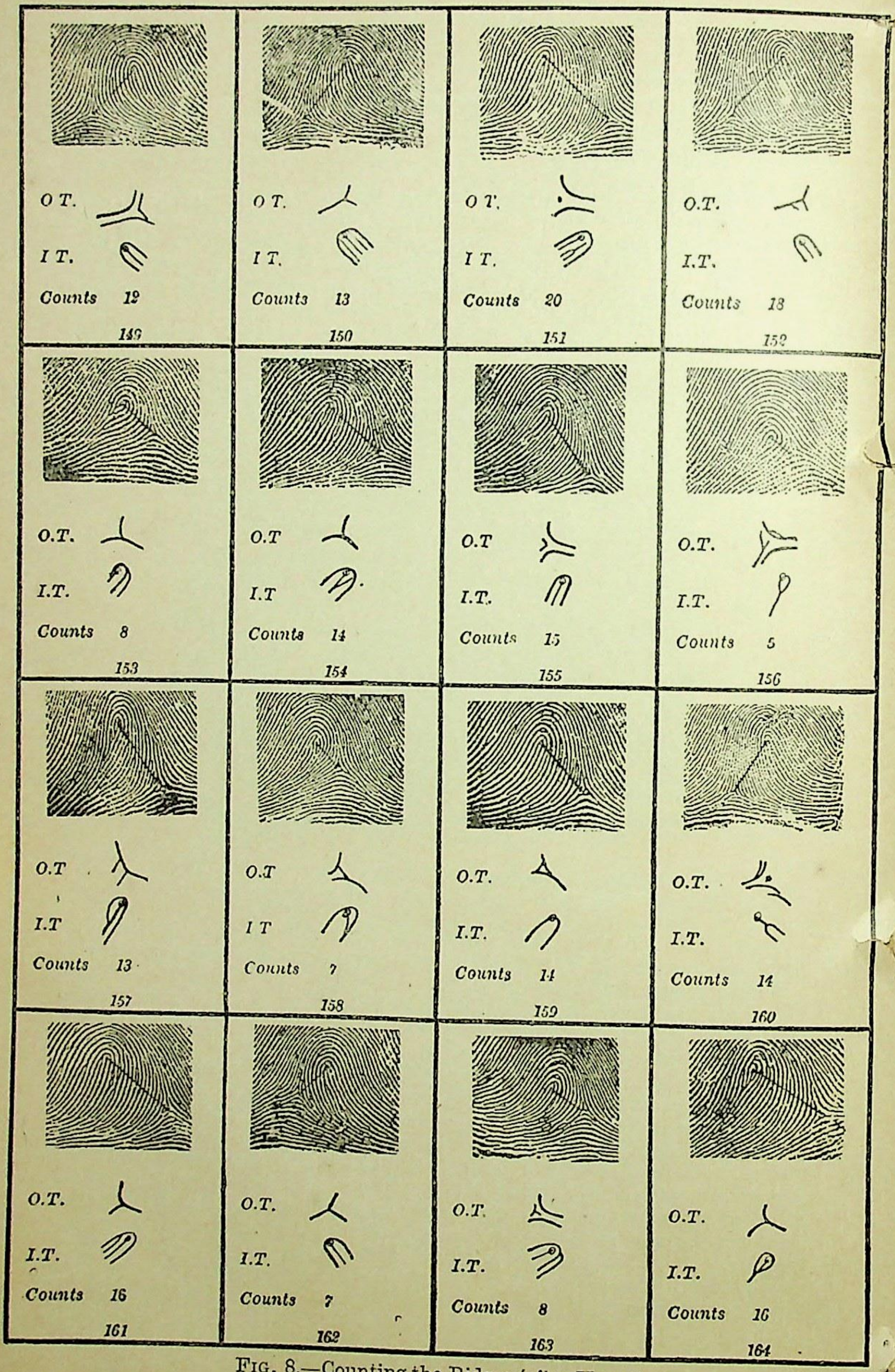


FIG. 8.—Counting the Ridges (after Henry).
O.T. = Outer terminus. *I.T.* = Inner terminus.

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Preparation of Finger-print Exhibits.—Crime investigators require to know how to secure the evidence of finger-prints at the scene of crime. A smooth article is likely to retain imprints if touched, whilst a rough surface is of little value. Any finger-print found, which is obviously not that of a resident of the house or a previously arrived police official, should be examined with a lens to ascertain whether it possesses sufficiently defined detail to photograph, as the absence of sufficient detail may render it useless. A special camera and procedure for this purpose used by the London police authorities (see Henry, *op. cit.*, 106, etc.); slow plates and a developer likely to produce the maximum contrast are used. The results are then presented alongside the finger imprint of the suspected person, and a sketch comparing the characteristic resemblances, as in Fig. 9.

Latent Finger-prints.—It is important to warn the police and others not to handle weapons, etc., which might have upon them, if left to skilled hands to examine, valuable silent testimony, as apparently invisible marks may be made visible. *Development of apparently invisible finger-prints.*—Dr. J. G. Garson's process is to dust an impalpable powder, light or dark, according to the colour of the surface suspected (finely powdered plumbago or grey powder), over the surface supposed to have been impressed by the papillary ridges of the fingers in their natural state as regards moisture. The powder will adhere to the papillary lines' impress, and can be examined with a lens, or permanently recorded by photography.[1]

Classification of Prints for Criminal Work.—This requires the services of a practised expert. The patterns of the papillary ridges fall into three main types, and a fourth or mixed one, thus—' arches,' ' loops,' ' whorls,' and ' composites.' The ' arches ' differ from the ' loops ' in having the ridges running from one side to another without exhibiting any backward turn (see Figs. 6 and 7, pp. 58, 59). In the impressions of the four types there are fixed points which serve useful purposes, termed the ' *delta* ' or ' outer terminus,' and the ' *point of the core* ' or ' inner terminus.' The core of the loop may consist of an even or an uneven number of ridges, termed ' rods,' or the summit of two rods may be joined to form a ' staple.' The arches may be ' tented,' etc., the loops ' pocket,' ' twinned,' etc. The relative frequency of the various patterns is, approximately—Arches 5, Loops 60, Whorls 35 per cent. The greatest variety of pattern is found in the forefinger, and the least in the little finger. In the Galton-Henry classification Arches are classed with Loops, and the Composites with the Whorls, so that only two divisions of patterns have to be dealt with, and these are recorded on a chessboard-like table with 1024 squares, the number of possible combinations for the digits. The actual formula of each pair of digits is recorded in the form of a fraction, of which the upper letter denotes the pattern of the first digit of the pair, and the lower that of the second digit; thus the right thumb and forefinger becoming respectively a loop and a whorl, is indicated as $\frac{l}{w}$, and a complete formula might be as follows:—

$$\frac{l}{w}, \frac{l}{l}, \frac{w}{l}, \frac{l}{l}, \frac{w}{w}$$

which, converted into figures, might be—

$$\frac{0}{16}, \frac{0}{0}, \frac{4}{0}, \frac{0}{0}, \frac{1}{1} = \frac{5}{17}$$

[1] *Trans. Med. Leg. Soc.*, II., 1905, p. 115.

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which indicates for record the compartment of the intersection of the 5th vertical row with the 17th horizontal row, if the respective rows are numbered 0 to 31 (see Fig. 9, D, also Fig. 8, for ridge-numbering of an ordinary Loop). First the line SB joins the two terminal points, 'inner' and 'outer' terminus. If the ridges which cut the line SB are *counted* they will be found to number 17, so this Loop is termed a Loop with 17 ridges or '*counts*,' and if it is the impression of a 'right-hand finger' it is an '*ulnar*,' or if left hand a '*radial*' Loop.

In presenting finger-print evidence in court it is necessary to employ an expert to explain the technical details of the exhibits to the court and jury. For India, the Central Finger-proof Bureau at Simla offers the best authority.

Cases.—(*a*) **Murderer detected by thumb-prints.**—The accused, Man Singh, Kayasth, a *daftari* at Muttra, was convicted of the murder of Durga Pershad. The case turned mainly on the identification of the accused by his thumb-mark. Durga Pershad was apparently a man of some means, but lived entirely alone. He lived a penurious life, without even a permanent servant in the house. His food was prepared by a Brahman woman, who attended for that purpose twice in the day. On the evening of the 4th of March, 1901, this woman prepared his food, and when going away left sitting at his house two men, one of whom she identified as the appellant, Man Singh. She knew Man Singh, because he was a constant visitor of Durga Pershad. Nothing suspicious was heard that night. In the morning, as no answer could be obtained from Durga Pershad's apartments, the police were sent for, and when they effected an entrance, they found the old man lying dead in his court-yard, which was covered with blood. The body was marked with twenty-four incised wounds. The old man had apparently been first attacked in his bed and sitting-room, for the matting on the floor near the bed was drenched with blood. His personal ornaments, etc., were gone, and no money was found in the house. All the boxes had been opened, but no ordinary clothes had been taken. But the murderer, in the words of the judge, had left a most damning piece of evidence behind him. On the ground near the body was a brass *lotah*, containing a little water, and on that *lotah*, broad and plain, was a bloody finger-print, with the whorls and ridges plainly marked. The mark was in the exact place it would be if the *lotah* were held for pouring native fashion, with all the fingers below it and the thumb on the side. The *lotah* was photographed at once. A *pugri*, out of which a piece had been torn, was also found, covered with blood. The police formed the idea that possibly the murderer, or one of the murderers, had got hurt in the struggle, and had used this bit of the *pugri* to bind up the wound. Some suspicion fell on the appellant, and on the 8th the sub-inspector examined his hand, on the back of which he found a long cut, the marks of which were visible at the hearing in the Sessions Court. In addition to the evidence of the Brahman woman, Kalki Chobe identified the appellant as one of the men who constantly used to visit Durga Pershad. Man Singh was accordingly arrested. One of the Muttra police was sent off to Allahabad with a photograph of the impression found on the *lotah*, and with the impressions of the thumb marks of several persons, including those of the accused. The impressions were examined by an expert in the Allahabad Central Office, and the impression of Man Singh's right thumb was found to correspond with the impression on the *lotah*.

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Justices Blair and Burkitt, in their judgment, remarked: "The witness, who is the head clerk of the Criminal Identification Department, through whose hands, as he swears, every year thousands of finger impressions pass, swears that the thumb impressions of the appellant's right hand, which was sent to him from Muttra, corresponds exactly with the thumb impression photographed from the *lotah*. That photograph has been enlarged at Allahabad by a photographic method without being

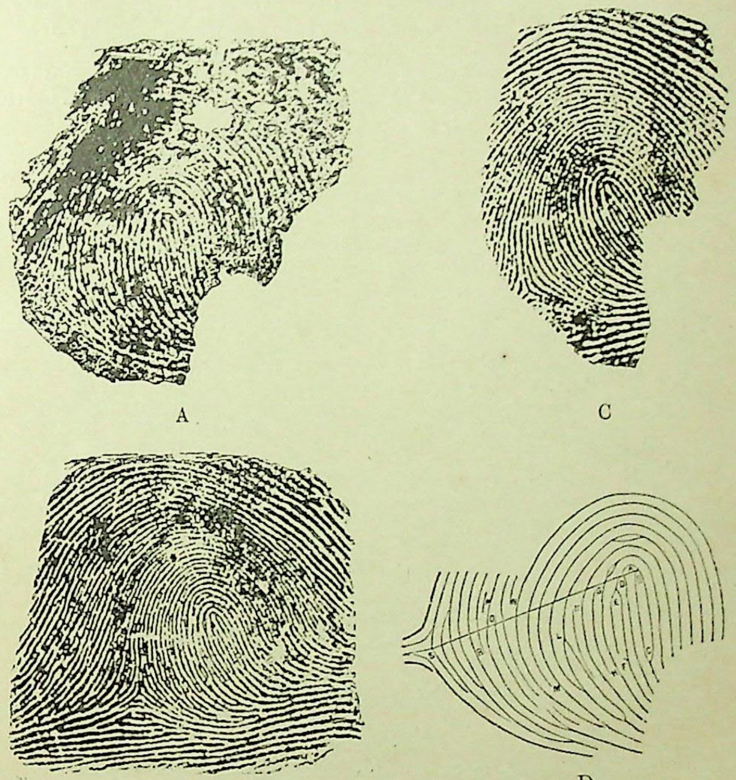


FIG. 9.—Identification of Bloody Thumb-print in Jalpaiguri Murder Case (after Sir E. Henry).

A, photo-mechanical enlargement of actual blood-print; B, same of thumb-print record in police office; C, same of fresh print; D, diagram of characteristic ridges, enlarged.

in any way touched up. The witness, in the closest detail, gives his reasons for believing that the two impressions are the impressions of the appellant's right thumb. That is evidence upon which we can safely rely." After referring to the test of this witness in the Sessions Court, already recounted in the words of the Sessions Judge, their Lordships continued: "In our opinion this evidence is conclusive of the presence of the appellant at the house of Darga Pershad on the night of the

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4th March and on the morning of the 5th, when Darga Pershad was murdered. The motive for the crime is not far to seek. The appellant was in very poor circumstances. Previous to the 4th of March he was indebted to several persons in small sums of money, which he was unable to discharge. There was also a decree under execution against him. After the 5th he was in possession of money, and paid off several creditors. It is not shown to us how he came into possession of those sums after the 5th of March. The only way of explaining it is by his statement to the Deputy Magistrate that he had received Rs. 15 and a shawl as his part of the plunder. Taking all the above facts into consideration, they lead us unhesitatingly to the conclusion that the appellant took part in the murder of Durga Pershad, and may possibly have been the sole murderer. We dismiss the appeal, confirm the sentence, and order that it be carried out according to law."—*Pioneer*, June 7, 1901.

A B

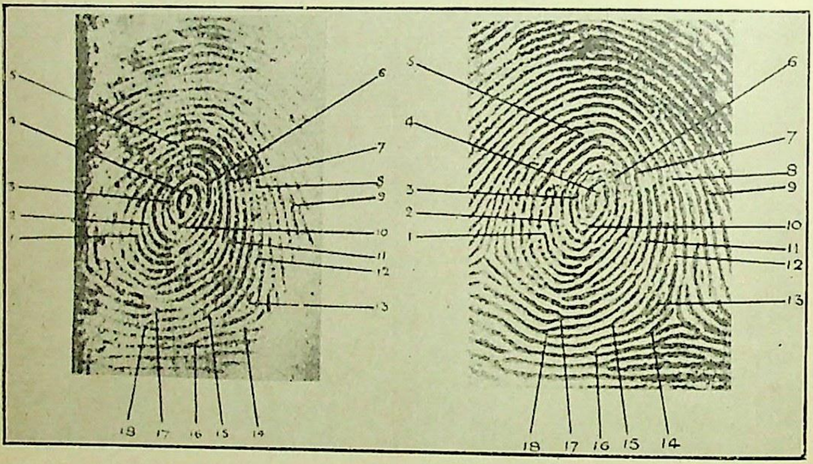


FIG. 10.—A, Photographic enlargement of mark on glass; B, Photographic enlargement of an imprint of the right forefinger of John McDermott. The characteristic points are numbered similarly in both figures (after Henry).

(*b*) **Bloody thumb-print** in murder case.—In 1889 the manager of a tea garden in the Jalpaiguri district was found lying on his bed with his throat cut, his despatch box and safe having been rifled, and several hundred rupees carried away. Amongst the papers found remaining in the despatch-box was a calendar, on the outside cover of which were two faint brown smudges, one of which, under a magnifying glass, was seen to be the impression of a person's thumb (see Fig. 9, A). This was sent to the central office of the Bengal Police. It was found to correspond exactly with the right-thumb impression of Kangali Charan (B), a former servant of the deceased, whom the latter had caused to be imprisoned for theft, and who had been released from jail some weeks before. He, in consequence, was arrested in Birbhum, a district some hundred of miles away, and brought to Calcutta, where his right-thumb impression (C) was again taken. D shows the ridge characteristics relied on in the identification. The Chemical Examiner certified that the

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brown marks on the calendar were mammalian blood, the inference being that the murderer or his associate gripped the calendar with his blood-stained thumb when rummaging amongst the papers in the despatch-box for the key of the safe. The accused was committed for trial before a judge and accessors, charged with murder and theft, and was finally convicted only of having stolen the missing property, the assessors holding that as no one had seen the deed committed, it would be unsafe to convict him of the murder, and the Supreme Court upheld this decision.

(c) The Deptford case.—In 1905 a man and his wife were murdered in their bed at a house in Deptford, London. They were in the habit of placing their money each night in a small cash-box kept under a pillow of the bed. After the murders the cash-box was found in the bedroom broken open, and the money gone. On the side of its inner tray was a faint digital mark, which was immediately photographed.

Subsequently two brothers, named Stratton, were arrested on suspicion, it being known to the police that they were in the locality about the time the murders were committed. Their finger-prints were taken, and the right thumb-print of one of the brothers was found to be identical with the mark on the cash-box.

No one saw either of these men go into the house or leave it. The finger-print evidence was most valuable.

They were convicted of the murders, and executed.—*Times*, May 8, 1905.

Forgery *of thumb-print signatures.*—It is not difficult to forge thumb-prints, as Major H. Smith, I.M.S., has shown, by covering the original thumb-impression with a damped paper and pressing, by which method the reverse of the original is transferred to the damped paper, and another piece of damped paper is then put over the reverse and pressed, when a true copy of the original adheres to the paper.

Foot-prints of Babies.—To prevent the crime of changeling or deliberate substitution of babies, or the accidental changing of babies by confusion in maternity hospitals, the system is now introduced of taking as a precautionary measure an impress of the babe's footprint, which thus forms a permanent life-record of identity.

The printing is taken in the same way as the finger-print. But it may be done so simply that any lay-parent can do it for themself. All that is necessary is to cover the sole of a child's foot with printer's ink by means of a roller, and then transfer the impression to a sheet of paper. The ink can be cleaned off the foot with alcohol. Care must be taken not to disturb the impressions before they are dry. There will then exist for all time a record of the baby's identity which would carry weight in any court of law in after years. No matter how much the feet grow, the lines will have grown with them, and their pattern will not be changed.

Bertillon's measurements of the ear and certain bony points which do not vary between adolescence and old age are specially used for the detection of criminals, but being more difficult to make, and varying so much with the personal equation of different operators, the use of this system has been given up by the police in India in favour of the finger-print

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system. The ear measurements are obviously useless in so many tribes which distort their ears by plugs and heavy rings, and in the thickening of leprosy.

Acquired Peculiarities.

1. **General condition** of body.—Fat and muscular or the reverse, baldness, etc.

2. **Scars and traces of old injuries.**—Scars by wounds, burns, and ulcers (syphilitic and other) tend to contract and become more linear in time, but being less vascular than the rest of skin, they are rendered more visible by friction. If necessary a lens should be used. Their number, situation, size, whether adherent, depressed, etc., should be noted—the size should be measured with compasses. A scar is inevitable after a wound, but where there is little loss of tissue and no suppuration, the scar may be slight. Small linear scars may disappear in time. Casper notes that the linear scars of cupping disappeared in three years. Large scars never disappear, and those of burns, scalds, and crushed wounds are more permanent than those of incised wounds. No scar can be artificially removed. It is very difficult to swear to the age of a scar, some remain red and vascular after many years.

Old fractures and ununited fractures may enable the identity to be established. The body of Livingstone, the great African explorer, was identified by an ununited fracture of the humerus due to the bite of a lion. In case of *Hanbil* v. *Nazeer Khan*,[1] identity was established by a peculiarity in the jaw-bone.

Case.—A Bengali impostor pretended he was a native gentleman whose death and consignment to the Ganges some years before was plainly proved. He denied the former fact and alleged that after being thrown into the river he revived. Medical evidence exposed the imposition by proving that part of the body of the deceased had been eaten away by an incurable disease.[2]

3. **Tattoo-marks.**—Unlike scars which are the result of accident or disease and located variously, tattoo-marks are the result of deliberate choice and often by the same operator, so that the same design may be reproduced exactly in the same situation on more than one individual. The pigment generally used in India is black or blue, but in Burma red is also extensively used. Pigments consisting of vermilion and ultramarine disappear more readily than Indian ink, soot, gunpowder, or carbon in other forms, which latter, according to

[1] 3 *Niz. Ad. Rept.*, 122 Chevers, 48. [2] Chevers, 100.

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Tidy, never disappear if inserted properly below the epidermis. The shortest time in which non-carbonaceous marks disappear is agreed to be ten years. Tattoo-marks cannot be removed unless the skin is destroyed, in which case a scar would remain. The claimant in the Tichborne case (p. 54) had a scar where it was sworn Arthur Orton had been tattooed. Faded tattoo-marks are made more distinct by strong friction.

4. **Loss of teeth and artificial teeth.**—Loss or deformity of teeth and presence of false teeth or correspondence of the jaw with a mould taken by a dentist for the purpose of fitting artificial teeth may be important in establishing identity (see Parkman's case, p. 69). The body of the Raja of Benares, who was slain in battle by Kuttub in 589 of the Hijra, was recognized among heaps of the slain by its artificial teeth, which were fixed in by golden wires and wedges.[1] A bite may show certain teeth missing; and so identify the biter.

5. **Occupation marks.**—Hands horny or otherwise; stains in hands of dyers, photographers, and painters, needle-pricked fingers in tailors, etc.; this is chiefly useful in unknown dead bodies.

6. **Memory of past events.**—This is often of great importance in cases of imposture, see Tichborne case, p. 54.

7. **Handwriting,** speech and voice, gait, tricks of manner, etc.

8. **Clothes and jewelry,** viz., ring, watch, visiting card, letter, etc. These are only of very secondary importance, as they are easily changed; for characteristic differences of native dress, see p. 50.

Light sufficient for Identification.

A flash of lightning undoubtedly affords sufficient light to enable an individual to so distinctly discern the features, etc., of another, as to be able to subsequently recognize him. The flash caused by the discharge of a pistol or gun, provided the circumstances are favourable, also similarly affords sufficient light for recognition and identification. Favouring circumstances are: close proximity to the discharge on one side of the line of fire; absence of other light; and not much smoke from the powder

[1] Dow's *Hindustan*, I., 145.

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Identification of Fragmentary Remains or Bones only.

The first thing to determine is whether the fragmentary remains are human or not. Then you note which side of the body or limb they belong to and try to fit the fragments together; noting the means by which the fragments have been separated, whether cut, or broken or torn asunder or merely grazed by dogs, jackals or other beasts or birds of prey. The state of decomposition of the soft parts may give a clue to the length of time elapsed since death. If vital organs are present, note whether they bear marks of injury likely to have caused death.

Where *bones only* are available it is desirable to record the details of the several bones individually (see Fig. 1, p. 40), for reference and proof of age, stature, etc. Any malformations should be specially noted. The odour of recent bones should be noted for the time of death. The odour of bones cleaned by ants, etc., is very different from that of old bones cleaned by decomposition in the earth.

"Professor A. Powell has upset a romantic police theory of murder by finding the nutrient canals of a skeleton filled with red wax containing much arsenic. He concluded the bones had come from a dissecting room."



In another case the skin from the lower part of the abdomen showed a linear operation scar with only two transverse stitch marks—one at either end. This suggested the operation had been performed by an American surgeon who used a continuous suture so that all the loops, except the first and last, remained buried below the surface. This fact led to the identification of the body.

Cases.—(*a*) **Callus and fractured bones**—Detachment of sacrum.—At Bankura in 1833 two witnesses deposed that the deceased, Meah Khan, was beaten a few hours before his death, one of the blows breaking his rib. The only bone produced in court was a rib, this had been broken but had osseous callus around both fractured ends, from which the civil surgeon was of opinion that the fracture must have occurred at least seven or eight days before death. The body in question was disinterred three months after the death of Meah Khan and the bones were found clean and free from periosteum, ligament, and cartilage, which the civil surgeon considered rendered it extremely improbable that the bones were those of a person who had died three months previously. Dr. Chevers, however, considered that mere *cleanness* of the bones could be accomplished by natural decomposition if exposed to the ravages of multitudes of ants and insects, the odour, however, of a recent bone thus rapidly cleaned by insects would in no way resemble that of one which had gradually undergone denudation underground.[1]

[1] Chevers, *M.*, 66.

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(*b*) **Dr. Parkman's case.**—Dr. Parkman, of Boston, U.S., was last seen alive entering the medical institution in which Dr. Webster was a lecturer on chemistry. A week afterwards, suspicion having been excited, search was made in Dr. Webster's laboratory, and the remains of a human body discovered. In one place a pelvis, right thigh, and left leg, were found; and in another the entire trunk and the left thigh. Among the ashes in the furnace of the laboratory, fragments of bone, blocks of mineral teeth, and a quantity of gold, were also found. Some of the chief points in the case were: (1) No duplicate parts were found. (2) The pelvis was clearly that of a male. (3) The parts of the body were free from all traces of the preservative fluids always employed in the dissecting room of the college. (4) *Piecing the parts together it was estimated* that the height of the body of which they formed portions was 70½ inches, or exactly the missing Dr. Parkman's height. (5) Three of the fragments of bone found in the ashes of the furnace when put together, made up the greater portion of the right half of a lower jaw. This was of peculiar shape, certain teeth were wanting from it, and it was found to fit exactly a cast of Dr. Parkman's jaw, which had a short time before been taken by a dentist who had supplied Dr. Parkman with artificial teeth, similar to those found in the furnace ashes. Dr. Webster was convicted, and subsequently confessed that he had murdered Dr. Parkman.—Guy, *F. M.*, 32.

(*c*) **Careless identification of bones.**—A married woman and her child, a girl aged four or five, disappeared at Meerut, under circumstances pointing to their having been murdered by a man named Kulloo, the woman's paramour. Kulloo absconded, but was subsequently apprehended while trying to sell ornaments proved to have belonged to the missing woman. Kulloo, when apprehended, made contradictory statements accusing other parties of the murder, and ultimately led the police to a place where several human bones were found, among them portions of two skulls, one small, the other larger. Among the fragments of the larger skull was an entire upper jaw (and half a lower jaw) with the teeth attached, and, near the bones, clothes, identified as having been worn by the child, were found. The civil assistant-surgeon, to whom the bones were sent, reported the bones to be those of two children, one about eight years, the other about eight months old. On this Kulloo was convicted of theft only. A re-inquiry was ordered; and at the trial held fourteen months afterwards, the civil surgeon was of opinion that the assistant surgeon had mistaken the bones of a small adult female for those of a boy, of about eight years old. The judge convicted the prisoner of murder, sentencing him to transportation for life. Here, had the portions of the larger skull been examined, and a record kept of their appearance, and of the teeth in the portions of the jaws, the question whether they belonged to a child of eight or to an adult could probably have been determined without difficulty.—Chevers, *M.*, 66.

(*d*) **Teeth and cartilage-tumour.**—(i) Identity of body was established by absence of left lateral incisor and by hair on back of head. Prisoner convicted. (ii) Remains of cartilaginous tumour of the neck in a body almost skeletonized led to identification.—*Ind. Med. Gaz.*, January, 1875.

The **Stature** may be approximately fixed by laying out the skeletal bones and allowing 1½ inches for the soft parts. If the femur is not found, the width of the two arms abducted from

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the trunk gives the 'fathom,' which nearly coincides with the height.

For estimating the stature from one cylindrical bone, Orfila gives a table which may err to the extent of over 4 inches. Tidy gives the following data in percentages of height.

Humerus from 17·4 to 19·5; radius, 13·2 to 14·5; femur, 22·6 to 27·51; tibia, 18·5 to 22·15; spine, 36·8 to 31·54.

To the above is added 1 to 1½ inches for the soft parts of sole of foot and the scalp: the variation, however, is too great to be of much service. In a dry skull with a hole in it of an alleged fracture, note if the hole is due merely to the falling in of an os triquetrum (when its margins will be jagged) or to a true fracture.

Even when identification is not established the death-sentence may yet be passed.

Cases.—(*a*) **Death-sentence with non-identified remains.**—*Reg.* v. *Sundamen.*—Deceased was induced by two others to leave his village under the pretext of looking for stolen cattle. On the way he was murdered. On the fourth day remains were found—"his skull in three or four places, grey hairs, a pair of shoes, and a bag with flint and steel. The jackals, vultures, etc., had nearly picked the bones clean." There was circumstantial evidence, and the sentence was—death to first prisoner. —*Madras Reports of Foujdaree Udalut*, 1859.

(*b*) **Non-identified remains.**—*Reg.* v. *Mahābalaya.*—Deceased was a Brahman, who had been sent to cash a cheque on a Friday, and did not return, and on the following Wednesday the remains of a man, with a Brahmanical thread, were found. "The witnesses could not identify the body, as the features were entirely decomposed." Some clothes near the body were identified, and certain persons who had been last seen with deceased were, on the strength of circumstantial evidence, convicted. The sessions judge recommended transportation for life, because the body had not been clearly identified, but the High Court (Foujdaree Udalut), seeing no reason to doubt that the remains were those of the missing man, sentenced to death.—*Madras Reports of Foujdaree Udalut*, 1859. Honore, June, 1859.

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CHAPTER II.

EXAMINATION OF THE LIVING PERSON.

THIS is usually much simpler than the examination of the dead in criminal cases, as it is often little more than a mere matter of surgical diagnosis. The medical expert should be furnished by the police or others with a note for his guidance, identifying the person and detailing every known circumstance of importance in the case on which his examination and opinion are required. This should be sent along with the person who is to be examined. In practice, the information thus sent to India is generally meagre and omits points of critical importance, and often it is untrustworthy and occasionally false.

The Record of the medical expert should note:—(1) The exact *time* and *place* of your examination; (2) the *name, sex*, age, occupation, and caste, if any, of the person examined; (3) the *personal-identity*, how made: this, in the case of a living person, is usually made by the police official who brings the person for examination or by some other mutually known individuals—whose names should be noted by you in your record and report: in the case of unknown persons, the necessary particulars for identification should be noted from amongst those detailed on page 35, etc.; (4) *details of the examination* of the alleged Wounds, or evidences of Rape (Chap. XIV.), Abortion (Chap. XV.), Insanity (Chap. XVIII.), Poisoning (Chap. XXI.), etc., as described in the special chapters.

Examination.—In the case of persons accused of criminal violence, you will look for scratches and other evidences of a struggle, such as the presence of hairs, blood-stains, etc., on the body and clothing. But before making an examination of an accused person you must *first obtain his consent*, and inform him that any indication which may be found of an incriminating nature will be used as evidence against him, and if he will not consent, the examination must not be made. Neither must

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you ask 'leading' questions or those which suggest the particular answer.

Your examination in some cases, such as rape, may extend to besides (1) the person of the victim, and (2) the accused, also to (3) site of the alleged offence, and to (4) stained clothes, weapons, or other articles submitted to you for examination.

The Exhibits, as these latter objects are termed, should, after examination, be carefully preserved by you as evidence, and should, whilst in your custody, be carefully sealed up by yourself and locked away to prevent their being tampered with. If sent to the Chemical Examiner, they should be duly labelled, attested, and sealed with your personal seal, of which an impression may accompany your letter to that officer (see detailed 'Directions' in Appendix IV.). Where there is more than one exhibit, each should be marked by a distinctive letter or number.

As the **alleged cause** of injury is not always the *true* cause, it is necessary for you to consider other possible causes than that which may be specified in the indictment.

Case.—**Alleged beating with poisoning.**—Stupor ascribed to a beating *found really due* to Datura poisoning.—A gentleman beat his punkah coolie with a slipper for going to sleep; some hours after the man was taken seriously ill. He became giddy and partially comatose. In this condition he was immediately taken before the doctor. He was made to vomit, and brought up a quantity of Datura seeds, which he had taken in a fit of passion after a love quarrel. Now, if this circumstance had occurred away from the station, and the man had died, the body would have been sent in with the remark "said to have died from the effects of beating." The medical examination would have established death from the effects of Datura, or in *default of a thorough examination* "no apparent traces of injury."—Chevers, *Manual Med. Jur.*, 35.

Your examination in cases of '*grievous hurt*,' *alleged rape*, *criminal abortion*, or *insanity*, should include the points noted in Appendix I. G—J, as well as those under those respective articles.

The Report Certificate of the results of your examination should invariably be prepared from your recorded notes with the utmost care and scrupulous precision, never perfunctorily. *Write legibly* and use in mentioning a disease the 'Nomenclature of Diseases.' *Never sign a certificate blank*, leaving the details to be filled in by an assistant. Where formal certificates are called for, read carefully the printed instructions and *refresh your memory each time* you write a certificate. For death-certificate, see p. 98.

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CHAPTER III.

EXAMINATION OF THE DEAD BODY.

THE medico-legal examination of a dead body for an inquest or other inquiry is one of the most important duties of civil surgeons and police-surgeons, and for its proper performance the most expert and experienced pathologist available should be employed. In Law, no assault can be committed against a dead body, so that in performing a *post-mortem* examination you are not committing an "offence." Yet it is an operation only to be conducted under due official warranty.

Legal Necessity for the Examination.

The object of the examination is to ascertain the cause and manner of death in all deaths from violence, or in sudden deaths from unknown causes, and in those suspicious cases in which the medical attendant is unable or refuses to give a death-certificate (see p. 98). In such cases it is not otherwise possible to exclude death from criminal violence even when unsuspected in death occurring apparently from 'natural causes.' For it is not uncommon to find that cases of apparently natural death without any external mark or wound on *post-mortem* examination prove to be cases of fatal poisoning, or fracture of the skull or ribs, rupture of internal organs, etc. See cases under-noted.

Cases.—(*a*) An old man was found dead in bed one morning, having apparently died in sleep. Face placid, pale. P.-M. examination showed death from carbolic acid poisoning. There was no smell of the acid in the room, and no bottle was found near the body, though afterwards one was found containing the acid in the house. No odour was noticed until the stomach was opened. There was no corrosion of lips, and nothing externally to indicate the nature of the case.—Sir H. H. Littlejohn, *Trans. Med. Leg. Soc.*, I., 1902, p. 16.

(*b*) A man travelling by train to Edinburgh, was found some stations off, apparently asleep under influence of alcohol, and died before reaching the hospital. There was no odour or bottle to be found, and nothing to suggest death from other than a natural cause. The magistrate demanded only a certificate based on external examination, but owing to

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the man's life being insured, a P.-M. examination was made, and revealed poisoning by prussic acid, probably suicidal.—Sir H. H. Littlejohn, *Trans. Med. Leg. Soc.*, I., 1902, p. 16.

(c) An old man was thought, after inspection of the body, to have died from heart failure of old age, but was subsequently found to have shot himself in the mouth with a revolver. There was no external evidence of the cause of death; no alteration of features, no effusion of blood, and no weapon found until some days after the event.—Sir H. H. Littlejohn, *Trans. Med. Leg. Soc.*, I., 1902, p. 17.

The body of a murdered person must as a rule be produced, be identified, and be examined, in order to warrant a conviction in law and even a trial. The many facilities for destroying dead bodies in India (see p. 20), affords the criminal in this country unusual opportunities for destroying this important part of the evidence of his guilt.[1]

On the other hand, the sentence of death was confirmed in a case in 1901, where the body was never found—

Case.—**Death Sentence** when body not found.—The appeal of Sheomangar Singh, the Raipuri Zemindar, who was convicted of the murder of a woman and sentenced to death by Mr. Stuart, Acting Session Judge of Allahabad, came before Mr. Justice Blair and Mr. Justice Chamier in the Allahabad High Court recently. In this case the body of the woman was never found, having been thrown into the Ganges, and Mr. Stuart referred to the question of passing sentence of death when the body of the murdered person had not been recovered. Their Lordships, in the course of their judgment, said: "No case could have been more satisfactorily proved, and it is difficult to imagine a case of grosser brutality. The conviction is thoroughly justified and the sentence is the only sentence possible." Their Lordships confirmed the sentence of death.—*Pioneer Mail*, July 12, 1901.

Method of Examination.

First the dead person is to be *identified* and then the *Cause of Death* is to be ascertained. Before beginning the examination it is advisable that the examiner be informed regarding all the circumstances of the death as far as is known; whether any violence was received or any known disease or condition which may have contributed to the death. Otherwise certain questions may be raised at the trial which the examiner may be unable to answer through not having his attention specially

[1] "According to Indian law, as administered by the Nizamat Adawlat, the finding of the body is not indispensably necessary to warrant even a capital sentence; but, in such cases, an irrevocable sentence is not usually passed." (Goodeve, in Beaufort's *Digest*, 1857, Homicide and Murder, Index C. *s.* 3980.) Goodeve here cites the case of Kanlal *v.* Chundwa (2 *Niz. Ad. Repts.* 82); bones were found, but these not being identified the court withheld the capital sentence, notwithstanding a confession, and in one of *Hanbil* v. *Nuzeer Khan* (3 *Niz. Ad. Repts.* 122), the result was the same notwithstanding the recognition of the skull by a peculiarity in the jaw-bone.—Chevers, *M.*, 48.

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directed to them. Begin your **notes** by recording the exact date and hour, place, when and where the examination is made, and how the body was identified.

The **Identification** when the body is found not long after death can be easily made by some one who knew the deceased intimately. But if putrefaction has set in, or an accident has disfigured or destroyed the features, or only a skeleton be left, the identification should be made by the medical expert in the manner already described (p. 35), for sex, age, state of teeth and jaws, height, general condition, colour of eyes and hair, whether any part denuded of hair, deformities, tumour, old scars, tattoo, perforations for nose and ear-rings; and everything distinctive in the way of dress, a ring, watch, letter or card, artificial teeth, sample of hair, etc., should be kept as evidence by the examining officer. When a body is that of some unknown person a photograph should be taken. In a skeleton, the following points should be specially noted, (1) whether the bones are human or animal, (2) sex, (3) height, (4) age, (5) race, (6) deformities or signs of previous injuries, (7) position in which bones are lying, and (8) probable length of time they have been buried or lying.

The **Cause of Death** in suspected criminal cases is sought for by (1) Inspection of the position, attitude and surroundings of the body on the spot where it was found before removal; (2) External examination of the body itself and its clothes and coverings (p. 76); (3) Internal *post-mortem* examination (p. 95).

I. Position, Attitude, and Surroundings of Body.

If summoned to the spot where the dead body has been found and is still lying, note carefully before removing the body or displacing its clothes:—

1. **Attitude of body** and position relative to surrounding objects. Note whether the body is lying on the ground or floor, or is lying on a bed, couch, or other article of furniture, or is seated or supported in a semi-erect or erect attitude, and, if so, how supported, or is suspended partly or completely by a ligature round the neck, etc., etc. Note the attitude of the limbs, and the position of the body in regard to surrounding objects; for example, whether the body is lying at the foot of a precipice, tree, or other high object from which it may have fallen, or is immersed wholly or partly in water, or is lying in a room, and if so, in what part of the room, etc., etc. Photographs for these and other conditions are desirable.

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2. **Nature,** condition, and position of objects in contact with or lying near body. Note if any objects are lying loosely in, or are tightly grasped by, the hands (not merely gluing by clotted blood); and if so, their nature and condition. Note any marks of jetting or spotting of blood on the walls, etc.—their presence indicates the person was still alive where found. Note the position, nature, and condition of any ligature on the body, and the exact situation of the knot, whether or not any stains of blood, vomit, etc., are present on or near the body, on floor, walls, doors, windows, or furniture, or any finger or footmarks, and whether any weapon or any vessel likely to have contained poison is lying near it, preserving such weapon, vessel, etc., for further examination. Note whether any confusion in the furniture or other signs exist in the neighbourhood of the body indicative of a struggle having taken place, or of the employment of weapons, or generally of the presence of persons other than the deceased, at the spot about the time of infliction of the injury.

Although examination of the spot where a dead body has been found and of the position of the body in regard to surrounding objects, often affords valuable information as to the circumstances under which death occurred (see cases of 'Wounds'), it must be recollected, however, that the spot where the body has been found may not be the place at which the act was done which caused death. In such a case the question will arise: What power of locomotion remained to the deceased after the act was done which caused his death, and was this sufficient to enable him to move from this spot at which the act was done, to that where the body was found? [1] The answer to this question may, it is evident, have an important bearing on the question: Was death due to homicide, suicide, or accident?

II. External Examination of the Dead Body.

Before detailing the **method** of this examination (p. 92), it is desirable here to consider the Modes and Signs of death, as two questions often asked are 'Is life extinct?' and 'How long has the person been dead?'

Death Modes.—By 'death' of the body is popularly meant '*somatic*' (as opposed to '*molecular*' [2]) death, *i.e.* the total

[1] See 'Wounds,' Chap. VI.

[2] '*Molecular*' death of the individual tissues and cells of the body does not occur till some time after somatic death.

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extinction of the vital activity of the entire body which is kept going by the heart and lungs acting under the control of the brain. Hence it is usual, following Bichat's arbitrary classification, to speak of **three Modes of Death,** according to whether death begins in one or other of these three organs respectively, irrespective of whatever the remote cause of the death may be:—(1) syncope (death in heart); (2) asphyxia (in lungs); (3) coma (in brain).

A more practical view and more in keeping with the facts is that formulated by Professor Powell for the assistance of medical practitioners in doubt whether to certify the cause of death as coma, syncope, or shock. He writes: "Even in cases of gross lesions of heart or brain, death in 'inhibition,' 'shock,' or 'syncope' arises from a paralysis, a failure of the heart muscle to contract. Immediately after death owing to failure to act—to contract—the heart is in diastole. Nature abhors a vacuum, therefore both sides of the heart are usually full shortly after death from inhibition.

"Later, when *rigor mortis* sets in, the heart, like the other muscles, becomes rigid, contracts and expels the blood from its cavities. If the autopsy take place now, Bichat's empty heart is found. Later, when rigor passes off, and gaseous decomposition has set in, the pressure of the gas drives the blood from the veins into the right side of the heart and distends it.

"Hence in death from syncope the *post-mortem* signs vary according to the time at which the autopsy is made.

"1*st Stage.*—Heart in diastole, flabby, both sides distended.

"2*nd Stage.*—In *rigor mortis,* both sides contracted and empty.

"3*rd Stage.*—In decomposition the right side, except in cases of hæmorrhage or perforation of the abdomen or thorax, will be full.

"After death from asphyxia, the pulmonary vessels being full, the contraction of *rigor mortis* is insufficient to empty the right ventricle."

Post-mortem signs of these modes of death are:—

In syncope if death has occurred by anæmia, both sides of the heart are found empty, and the heart itself, if examined soon after death, is contracted. If death occurred by asthenia, or by poisoning with prussic acid, the heart is found relaxed, flabby, with its cavities empty or full—if the latter, both sides are equally full. In coma and asphyxia the venous system and right side of heart and lungs are gorged with dark blood, and the left side of heart is usually empty. In coma there is effusion of blood into the serous cavities, apoplexy, rupture of vessels in fracture of skull, etc. In asphyxia there is much greater engorgement of lungs and venous system than in coma, and the lungs may show apoplectic effusions into

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their substance with patches of superficial emphysema and sub-pleural ecchymosis or Tardieu's spots (see 'Asphyxia'). In some cases of sudden death the most careful examination fails to find any of these positive lesions. In such cases it may be that death occurred by the sudden stoppage of the heart by violent emotion.

Signs of Death.

"Lend me a looking-glass;
If that her breath will moist or stain the stone,
Why, then, she lives!"
Shakespeare's *King Lear*, V. 3.

The fact of actual death is ordinarily ascertained with little difficulty. The most patent and positive sign of death is the commencement of general putrefaction of the body, which takes place some time after death. But a considerable time before putrefaction has set in, the fact of death is occasionally the subject of some doubt. Cases have occurred in which persons in a state of deep trance or catalepsy have been supposed to be dead and been *buried alive* (see below). It is well, therefore, never to give a death certificate, or think of opening the body until you make quite certain that the body is actually dead as detailed in 'Signs of Death' (p. 81), and 'Apparent Death and Death-trance' (see below).

Simulated death for purposes of extortion is easily detected by pricking with a pin or by the application of a flame or the actual cautery to the skin, or insertion of cayenne into the conjunctiva.

Apparent Death, Death-trance, and Premature Cremation or Burial.

The tragic possibility of cremating or burying live persons is in India a very real danger, in view of the hurried disposal of bodies within a few hours after apparent death, owing to climatic reasons, and the want of sufficient medical examination. Even in Europe, where a long interval of several days intervenes, numerous authentic cases are recorded of people being buried alive or rescued by accident on the verge of the grave. In India many cases also are reported,[1] and there is reason to believe that this practice is not altogether infrequent. Such individuals rescued from the funeral pyre usually lose their caste, and pyre attendants have admitted that when bodies show signs of animation they stuff mud into the mouth and nostrils of the body in the belief that the movements are the work of evil

[1] *Indian Jour. Med. and Phys. Science*, 1836, I., 389; *Calcutta Jour. Med.*, 1869, II., 383; W. Tebb, *Premature Burial*, London, 1896, pp. 60-63, 90, 91, 125, etc.

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spirits. Suspended animation may possibly occur not merely in the rare instance of lethargic stupor and catalepsy, but in the commoner acute diseases, cholera, fever, sunstroke, and other nervous affections, traumatic concussion, tetanus, 'teething' convulsions, lightning-stroke, drowning, chloroform-poisoning, collapse after child-birth, in still-born infants. In such cases, where there is the slightest doubt of actual death, artificial respiration and other restoratives should be assiduously practised; *even when the circulation and respiration have apparently ceased.* In the case of infants these attempts to restore the possibly latent life should be persisted in for several hours (see cases below), and in no case should one single 'sign' of death short of putrefaction be relied on. The salutary British military rule which compels a *post-mortem* examination on every soldier, *not earlier than twelve hours* after disease, is a safeguard that should be made of universal application in India. In 'death-trance' where no sign of vitality can be recognized, the presence of life may be ascertained, (1) by the absence of any sign of decomposition, (2) by the normal appearance of the fundus of the eye as seen by the ophthalmoscope, (3) by the persistence of the excitability of the muscles to electricity—this excitability disappears in about three hours after actual death.

Case.—**Premature Burial.**—The celebrated actress, Mlle. Rachel, 'died' at Paris on 4th January, 1858. After the process of embalming her body had already been begun, she awoke from her trance but died ten hours later from the injuries thus inflicted.—Dr. Hartmann, *Premature Burial*, London, 1896, p. 80.

Case.—**Yogi's Ecstatic Trance.**—In Delhi in 1889, Dr. H. C. Sen and his brother, Mr. Chandra Sen, Municipal Secretary, examined a well-known *Yogi* devotee in a self-induced trance in which he appears to have been seated cross-legged in Buddha-fashion. They found that the pulse had ceased to beat altogether, nor could the slightest heart-beat be detected by the stethoscope. The *Yogi* was placed in a small subterraneous masonry cell and the door locked and sealed by the city magistrate. At the expiration of thirty-three days the cell was opened and the devotee found just where he was placed but with a death-like appearance, the limbs having become stiff as in *rigor mortis.* He was brought from the vault and the mouth rubbed with honey and milk and the body massaged with oil. In the evening manifestations of life returned. He was fed with a spoonful of milk, and in three days was able to eat his normal diet, and was alive seven years after.—W. Tebb, *Premature Burial*, 1896, pp. 44, 45.

Case.—**Children resuscitated four to seven hours after apparent death.**—Prof. Fort reported a child aged three as resuscitated by artificial respiration continued for four hours and *not commenced until 3½ hours* after its apparent death.—Tidy, *Leg. Med.*, I., 39. Ogston records the case of a child being alive about seven hours and a young woman alive four hours after they had been left as dead.

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The **exact moment of death** (*i.e.* somatic death) is sometimes of importance not only in cases of suspected foul play (see *Onset of Cadaveric Changes*, p. 85), but in successorship, where it is necessary to prove that a child was or was not born before the death of a testator, as a will takes effect from the moment of the death of the testator, and not from the date of finding or proving the will.

Legal presumption of death.—In India the law is (*a*) that if a person is proved to have been alive within thirty years, the legal presumption is that he is still alive, except (*b*) it is proved that the person has not been heard of for seven years by those who would naturally have heard of him if he had been alive, in which case the law presumes that he is dead (*ss.* 107 and 108, I. Ev. Act). The law, however, presumes nothing as to the time of his death, the period of which, if material (as it often must be in cases of succession and inheritance), must be proved by evidence. In either case the presumption arising may be rebutted by proof, in case (*a*) of the person's death; in case (*b*) of his being still alive. In France, a legal presumption of death arises after thirty-five years of absence, or after one hundred years from date of birth.

Question of presumption of Survivorship.—When two or more persons die at almost the same time, or by a common accident, the question may arise who survived longest; and if no direct evidence on this point is available the question becomes one of presumption of survivorship. As an example of the cases in which this question arises, suppose A to have left property by will to B, and that A and B die by a common accident, no direct evidence being available as to whether A or B died first. Here the question of presumption of survivorship may arise, because if A died before B, B may be considered to have succeeded to the property left him by A, and B's heirs inherit; while if B died first, A's heirs inherit, seeing that B never succeeded to the property willed to him by A. In some countries definite rules of law exist by which such cases are decided. In France, for example, some of the rules laid down are (1) If all those who perished together were under fifteen, the oldest shall be presumed to be the survivor. (2) If all were over sixty, the youngest shall be presumed the survivor. (3) If all were between fifteen and sixty, the males shall be presumed to have been the survivors if the ages were equal, or the difference in ages not greater than one year; in other cases the youngest shall be presumed the survivor. The English law presumes nothing in cases of this kind, and if therefore a person made a claim and had, in order to substantiate it, to prove that A survived B, and had no proof of that fact beyond the assumptions arising from age or sex, he could not succeed. It may, however, be pointed out, that in questions of this kind it is likely that the strongest lived longest. There are, however, certain exceptions, *e.g.* (1) When a mother and child both die during delivery, if the death of the mother has been caused by hæmorrhage, it is probable that the mother died first. (2) If a number of persons die from the effect of excessive heat, it is probable that the adults died first, children and old persons bearing heat better than adults. (3) When the cause of death is drowning, as females are more likely to faint than males, and as the occurrence of syncope delays death by asphyxia, it is possible that females may survive longer than males. If, however, there has been a struggle for life, it is probable that the males,

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being stronger, survived the females. (4) Where the cause of death is starvation, aged persons (if healthy and robust), requiring less food than adults and children, probably live longest.

The chief **Signs of Death** are :—

1. **Cessation of Circulation or Heart-Beat, complete and continuous.**—The entire cessation of the circulation for over five minutes is usually in itself evidence of death. In cases of fainting and prolonged typhoid of low type, and 'suspended animation' the heart may cease to beat for several seconds, and in newly born infants and in the apparently drowned may cease for ten or fifteen minutes, but continuous and complete cessation means death. M. Rayer, from observations on the dying, assigned seven seconds as the maximum interval observed between the last two pulsations of the heart. Tidy (*Leg. Med.*, I. p. 138) quotes a case of a man aged 33, where for eight minutes no heart sounds could be detected, the man ultimately recovering.

Suspended Animation under Anaesthetic.

Case.—**Child resuscitated after Heart had stopped for thirteen minutes.**—A. Davies, aged six, Streatham, was having his tonsils removed for adenoids at Guy's Hospital in 1916, when the heart failed. An incision over the cardiac region was made and the heart massaged, until its action was restored. Recovery was complete and the boy now runs about as usual. "It is certain that the heart had stopped at least thirteen minutes."—*Guy's Hospital Magazine*, 1916.

Suspended animation—Voluntary.—Cases are recorded of persons who have apparently possessed the power of voluntarily suspending the action of the heart.

Cases.—(*a*) **Case of Colonel Townshend,** quoted from Cheyne (Guy, *For. Med.*, p. 214) :—"He (Colonel Townshend) told us that he had sent for us to give him some account of an odd sensation he had for some time observed and felt in himself, which was that, composing himself, he could die or expire when he pleased, and yet by an effort or somehow he could come to life again, which it seems he had sometimes tried before he had sent for us. We all three felt his pulse first; it was distinct though small and thready, and his heart had its usual beating. He composed himself on his back, and lay in a still posture some time; while I held his right hand, Dr. Baynard laid his hand on his heart, and Mr. Skrine held a clean looking-glass to his mouth. I found his pulse sink gradually, till at last I could not feel any by the most exact and nice touch. Dr. Baynard could not feel the least motion in his heart, nor Mr. Skrine discern the least soil of breath on the bright mirror he held to his mouth. Then each of us by turns examined his arm, heart, and breath, but could not by the nicest scrutiny discover the least symptom

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of life in him. This continued about half an hour. As we were going away (thinking him dead), we observed some motion about the body, and upon examination found his pulse and the motion of his heart gradually returning; he began to breathe gently and speak softly." Col. Townshend died the same evening, and on *post-mortem* examination all the viscera were found healthy except the kidneys, for disease of which he had been long under treatment.

(*b*) Dr. Duncan, Edinburgh, mentions the case of "a medical student who, like Col. Townshend, simulated successfully the appearance of death; he died, however, some time afterwards of disease of the heart."—Ogston, *Med. Jur. Lect.*, 364.

Tests to ascertain whether the circulation has ceased:—(*a*) **Pulse.**—Feeble pulsations of the heart may not be perceptible at the wrist, besides the radial arteries are sometimes abnormal in their distribution. (*b*) **Auscultation.**—Stethoscope may fail to detect a very feeble pulsation of the heart. (*c*) **Tie cord tightly round a finger.**—If any circulation is going on, the finger will swell beyond the ligature. (*d*) **Open small artery,** if still in doubt. No jerking spurt will occur if the heart is not beating. (*e*) **Heat or a blister on skin** will not produce a true vesicle **with red** margins on a dead body. (See 'Burns.')

2. **Cessation of respiration,** complete and continuous.—Three and a half minutes is considered the extreme limit during which respiration may absolutely cease and life be maintained. In divers and in Cheyne-Stokes respiration, two and one minutes respectively are the probable limits. In newly born children life has been known to continue for a considerable period without respiratory movements being apparent, and occasionally in older individuals.

Tests:—(*a*) A cool bright looking-glass held in front of the mouth will be dimmed by the moisture of the breath if respiration is going on. (*b*) A feather held over nostrils will move if respiration is continuing. (*c*) A shallow vessel of water or mercury placed on the chest will show movement in its reflection of a spot of light from its surface if there be movement of the chest walls.

Case.—**Suspended respiration.**—Professor Maschka, of Prague, related in his lectures that a "mature child, which showed no signs of life, was placed in the anatomical rooms of the university, left there for fourteen hours, and then taken to the physiology classroom. On laying open the chest, no blood flowed from the integuments and soft parts in front. When the heart was reached, it was seen pulsating at the rate of twenty beats per minute. The lungs were seen to be in the fœtal condition."—Ogston, *Med. Jur.*, 365.

3. **Changes in the eye,** *e.g.* loss of sensibility of the pupil, loss of transparency of the cornea, loss of tension of the eyeball. None of these are reliable. The pupil may for a short time after death still respond to the action of atropia; and loss of transparency of the cornea, and of tension of the eyeball, may occur during life.

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4. **Cooling of the body.**—After death the temperature of the body tends to fall to that of the surrounding objects, and if these, as is usually the case, are lower in temperature than the body, a gradual cooling of the body takes place.

In death from certain diseases, however, the temperature of the body may, at the time of death, be higher than the normal, and may even rise considerably after death. Thus in cases of death from yellow fever, cholera, small-pox, rheumatic fever, Bright's disease, abscess of the liver, peritonitis, tetanus, and injuries of the nervous system generally, etc., a *post-mortem* rise of temperature, amounting in some cases to even 9° F., has been observed,[1] owing to chemical changes in the molecular life of the tissues, and partly in some cases due doubtless to microbic activity. The normal body temperature in India ranges from 97° F. to 99° F.,[2] whilst the mean temperature of the air and surrounding objects in India is frequently 90° to 97° F., or even more in the summer and autumn. Hence a body may rapidly 'cool' as far as is possible under these circumstances, and so permit of *rigor mortis* setting in at a very much earlier period than in temperate Europe. The average rate of cooling in a temperate climate is about 4° F. during the first three hours, and afterwards about 1° F. per hour. In temperate Europe a dead body is cold in from eight to ten hours. In tropical or sub-tropical India much less time is required, as the body has to cool through far fewer degrees of temperature to reach the temperature of the air and its surroundings. Loss of heat is **delayed** by (1) Acute fever as the cause of death. (2) Sudden death, as the nutrient material continues to burn after death. (3) High temperature of surrounding air or water. (4) Stillness of air in small room. (5) Obesity and bulk. Bodies of children and the aged cool more quickly than middle aged. (6) Covering of body by non-conducting clothes, etc., retards loss of heat. It is **hastened** by (1) Chronic wasting disease. (2) Lingering death. (3) Coldness of air. (4) Access of cool draughts of air. (5) Leanness and extreme youth or old age. (6) Exposure of body without coverings. (7) Immersion in water, especially running water.

5. **Cadaveric hypostasis,** or 'Suggilation.'—This *post-mortem* staining of the skin is due to the fluid blood sinking under the effect of gravity to the most dependent parts of the body. It begins to appear a few hours after death (3 to 4 Tidy, 4 to 12 Mann), first at back of neck, chest, and calves as a dusky red discoloration. Hypostatic congestion indistinguishable from *post-mortem* suggilation may set in *long before death*: Professor Powell has seen striking hypostasis in morphine poisoning, in plague, and in cholera two hours before death.

It can be distinguished from the true ecchymosis of a bruise by observing that (1) it is only in the most dependent part of the body, (2) it is not elevated above general level, (3) its margins are sharply defined, (4) its surface is not abraded, (5) an incision into it does not show clotted blood outside the vessels but simple staining. This distinction can be made even when decomposition is far advanced.

[1] Tidy, *Leg. Med.*, I. 46. [2] Waddell, L. A., *Ind. Med. Gaz.*, 1884.

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Cases.—(*a*) **Hypostasis** mistaken for marks of injury. *Emp.* v. *Falkytter*, Cachar Sessions, 1898. Lt.-Col. Borah, I.M.S., deposed that "the back of the head, the back of the neck, the back of the buttocks, the back of the thighs and of the calves were covered with bruises" such as might have been caused by blows of a stick. On cross-examination he admitted he was unable to distinguish *post-mortem* hypostasis from contusions. Accused was acquitted.

(*b*) Three men left a public-house intoxicated and quarrelling. On the next morning one of them was found expiring in a wood, and he died soon afterwards. Two surgeons deposed that they found the marks of numerous contusions all over the body, and upon this deposition the two companions of the deceased were committed and subsequently tried. At the trial, Drs. Bell and Fyfe proved, to the satisfaction of the court, that the apparent contusions were nothing else than the livid patches, or hypostasis, which sometimes occur spontaneously on the dead body after many kinds of death. The accused were acquitted.—Taylor, I. p. 88.

See *Bain* Case in Appendix.

6. **Cadaveric rigidity, or Rigor Mortis.**—This stiffening, which occurs after the body has become 'cold,' is due to changes in the muscles on their molecular death. After somatic death, the muscles pass through three stages, namely, 1st, relaxed with contractility; 2nd, rigid and non-contractile—the *rigor mortis* stage; and 3rd, relaxed with incipient decomposition.

In the 1st stage the muscles are relaxed, but contract on the application of stimuli. This stage in exceptional cases may last only a few minutes, or even be absent, as in the case of soldiers killed in battle clutching their guns or swords, and pistols or knives grasped in the hands of suicides—this form has been called cadaveric spasm (see p. 87). This relaxation lasts about three hours. There is no case on record where this stage has lasted as long as twenty-four hours. In Bengal, Mackenzie found the average to be 1 hour 51 minutes. If therefore the muscles respond to electric stimulation over three hours after supposed death, there is a presumption against actual death (see 'Death-trance').

In the 2nd stage, that of cadaveric rigidity, or *rigor mortis* proper, the muscles become rigid, partly from coagulation of myosin. All muscles, both involuntary and voluntary, are affected, and the rigidity occurs independently of nerve influence (paralyzed limbs becoming rigid unless complete degeneration of the muscles has taken place), and independently also of the rate of cooling of the body. It is *hastened* by any exhausting influence on the muscles immediately before death (see *Bain* Case, App. V.), such as violent muscular exercise or exhausting disease. It is *retarded* in speedy death of healthy individuals in repose.

The time of onset of cadaveric changes in India is different from in Europe.—As the time of onset of the cadaveric changes is of great importance in fixing the time of death, and there were no data on record for India, Dr. Mackenzie undertook

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in 1883, a series of observations to ascertain these points, the results of which are here summarized.

SUMMARY OF ONSET OF CADAVERIC CHANGES IN INDIA.[1]

Changes.	Average.		Earliest.		Latest.		Average for October of 10 cases.	
	hrs.	min.	hrs.	min.	hrs.	min.	hrs.	min.
Muscular irritability lasts from death	1	51	0	30	4	30	1	42
Rigor mortis begins	1	56	0	30	7	0	1	10
,, ,, duration	19	12	3	0	40	0	31	30
Green discoloration appears ..	26	4	7	10	41	0	24	16
Ova of flies appear	25	57	3	20	41	30	—	
Moving maggots appear ..	39	43	24	18	76	0	81	21
Vesications appear	49	34	35	0	72	0	59	8
Evolution of gases	18	17	5	50	34	30	29	17

The changes were observed in the bodies of persons dying in hospital in Calcutta mostly from chronic diseases.[2] Thirty-six cases were examined between July and September with an average aerial temperature of 85·5° F., and 10 cases in October with an average air temperature of 81·8° F. It will be seen that, as was to be expected, the data differ considerably from those made by Casper in Berlin and by other observers in Europe—the changes generally occurring considerably earlier in India owing to the heat and humidity.

Time of onset of Cadaveric Changes in India.

This is very variable. Sometimes it commences within a few minutes after death, under the conditions above noted, but usually in temperate climates it begins 5 to 10 hours after, and takes about 2 to 3 hours to develop.[3] In India, owing to the climate and to the body becoming 'cold' more quickly, it usually commences 1 to 2 hours after death, and takes 1 to 2 hours to develop.

[1] *Based on Dr. Mackenzie's data for July to September*, 1889.

[2] *Ind. Med. Gaz.*, 1889, p. 167.

[3] Niderkorn found it to be fully developed before the end of the seventh hour after death in 92 out of 113 cases (Tidy, *Leg. Med.*, I. p. 62). Taylor (3rd Ed., 1888, I. 513) gives 5 to 6 hours from death for *rigor mortis* to set in, 16 to 24 for its continuance, or 21 to 30 hours from death on an average. Tidy gives 3 to 6 hours, and from 36 to 48 hours respectively, or 27 to 54 hours from death on an average. But in sudden death in a muscular subject for hæmorrhage, *rigor mortis* may continue for 14 *days* or longer (Tidy, *Leg. Med.*, I. 71). The figures apply to a cold climate.

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Onset of Rigor Mortis.—Of the 36 cases observed by Mackenzie in Calcutta, in July to September, the earliest onset of *rigor mortis* was 30 minutes, the latest 7 hours, and the average 1 hour and 56 mins. In 6 cases it was from 30 minutes to 1 hour, in 19 cases from 1 to 2 hours, in 5 cases from 2 to 3 hours, in 2 cases from 3 to 4 hours, in 3 cases from 5 to 7 hours.

In cases where just previous to death the muscles have undergone great fatigue, and also in cases where the irritability of the muscles has been exhausted by a powerful electric discharge, as in death from lightning stroke, also in death from cholera, tetanus, poisoning by opium or strychnia, rigidity may come on at once and the body stiffen in the position it was in at the time of death. On the other hand, in cases of sudden death, except from lightning, rigidity comes on late, provided always, of course, that the muscles just previous to death have not been subject to great fatigue, or to anything tending to exhaust their irritability.

Duration.—This depends greatly on the state of the muscles at the time of death. Generally speaking the sooner rigidity sets in the *sooner* it passes off, and the longer it is in appearing the *longer* will it last. It averages 24 to 48 hours in temperate climates (Tidy), but may continue for several days. Cold tends to prolong and heat (probably) to shorten it. For India, Dr. Mackenzie [1] observed the following times. Of 36 cases the shortest duration was 3 hours, the longest 40 hours, while the average was 19 hours and 12 minutes. In 3 cases it lasted less than 5 hours, in 6 cases from 5 to 10 hours, in 3 cases from 10 to 15 hours, in 6 cases from 15 to 20 hours, in 14 cases from 20 to 30 hours, and in 4 cases from 30 to 40 hours.

Order of onset and disappearance.—In Europe this rigidity appears: 1st, in muscles of lower jaw; 2nd, in face, neck and trunk, and lastly, in limbs, and it disappears in the same order. In Bengal in the rains it appeared in the majority of cases: 1st, in lower jaw and neck simultaneously; 2nd, in back muscles; 3rd, upper limbs; 4th, lower limbs, and it disappeared in same order.

Case.—**Time of death determined by rigor mortis.**—Case of Jessie McPherson (Glasgow, 1862). *Reg.* v. *McLachlan.*—The body was first seen by Dr. Macleod on the night of the 17th July, *i.e.* in midsummer, when the mean temperature of the air was 50° F. "The *rigor mortis* was present in all the articulations, but it was then departing. The body was perfectly cold, even on the abdomen and at the flexures of the joints. There were no signs of decomposition, and the temperature was usually cold. By 10 A.M. on the next day, *rigor mortis* had disappeared from all the joints except the knees and the ankles. Death had resulted from violence and from profuse hæmorrhage. The

[1] Brinton, *Amer. Jour. of Med. Soc.*, January, 1870.

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victim was free from disease. *Rigor mortis* sets in generally from 10 hours to 3 days after death. When, however, death has been sudden, and is due to violence, it sets in more slowly; and Macleod therefore considered that in this case, at least, 48 hours must have elapsed from the time of death until the rigidity set in. But when the *rigor mortis* sets in slowly, it lasts all the longer and *vice versâ*, the average period of disappearance being from 24 to 36 hours. He therefore considered that in this case the rigidity must have lasted 30 hours, and, putting these figures together (48 and 30), he arrived at the conclusion that about 3 days had elapsed since death. The evidence subsequently recorded proved, as nearly as could be, that this was the time which had passed between death and the examination of the body."—Taylor, 3rd Ed., I. p. 85.

See also Gardner's case, and Sudhabode Bhattacharji's case.

Cadaveric spasm, or instantaneous *rigor mortis*, is a term applied by Taylor and others to rigidity which *in rare cases* occurs at the moment of death in sudden deaths. This rigidity passes sooner or later into *rigor mortis* though not unnecessarily identical with it. It is usually muscular contraction. Very rarely important evidence as to the cause of death may be derived from the presence of objects in the hands under the influence of cadaveric spasm; but *the object is not usually grasped*, as the fingers usually relax after death.

Case.—**Alleged fabrication of evidence of suicide.**—"A man tried in France, in 1835, narrowly escaped conviction as the murderer of his father. The latter had been found dead in a sitting posture, with a recently discharged pistol in his right hand, the weapon resting upon the thigh in such a way that the slightest motion of the part would apparently have caused it to fall. It was assumed that the son had produced the injury to the face, which had been the cause of death, and had afterwards placed the pistol in his father's hand, in order to induce the supposition of suicide. The medical evidence, by showing that the grasping of the weapon could not have been simulated after death, lead to an acquittal." [1]—Ogston, *M. J. Lect.*, 365.

See also case of *Imp.* v. *Sudhabode Bhattacharji.*

With the disappearance of rigidity, the 3rd stage of relaxation, due to incipient decomposition, commences; this softening is not necessarily putrefactive, as micro-organisms are not always found in the relaxed muscles in this stage.

7. **Putrefaction,** General.—This condition, which begins when *rigor mortis* ceases, is the most absolute and certain of all signs of death. It is the decomposition of the nitrogenous elements of the tissues by bacteria (chiefly *bacterium termo*) with colour changes and the evolution of foul-smelling gases.

Ante-mortem Gases.	**Post-mortem Gases.** Early.	Later.	Latest.
H	H_2	CH_4	NH_3
CH_4	CH_4	CO_2	CO_2
CO_2	CO_2		
SH_2	SH_2		
O	PH_3		
N			

[1] Ogston, *Brit. For. Med. Rev.*, 1857, 303; Tidy, *Leg. Med.*, I. 64.

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The putrefaction changes occur generally in this order.

(*a*) **Colour changes.**—Externally a greenish spot appears on the abdomen with odour of putrefaction and the eyeballs become soft and yielding. Greenish discoloration spreads over body. It is due to destructive decomposition of the red blood corpuscles with the solution of their hæmoglobin in the serum. In Calcutta during the rains, Mackenzie found that the latest period at which the green discoloration of putrefaction appeared was 41 hours and 30 minutes, the earliest period was 7 hours and 10 minutes, and the average period was 26 hours and 4 minutes. In 2 cases it occurred under 10 hours, in 4 cases from 10 to 20 hours, in 18 cases from 20 to 30 hours, in 10 cases upwards of 30 hours, and in two cases it was not observed at all.

(*b*) **Blisters form under the epidermis.**—Mackenzie's latest period for the appearance of vesications on the surface of the body was 72 hours, the earliest period was 35 hours, and the average period was 49 hours and 39 minutes. In 17 cases it occurred in from 35 hours to 48 hours, in 10 cases from 48 to 60 hours, in 5 cases from 60 to 72 hours, and in 4 cases it was not observed at all.

(*c*) **Maggots appear.**—The time of appearance of these is much earlier in India than in Europe. The latest period at which *immature* maggots (which are chiefly the larvæ of the house-fly and flies of the "blue-bottle," *Calliphora sp.*) appear was in Mackenzie's cases 41 hours and 30 minutes, the earliest period was 3 hours and 20 minutes, and the average period was 25 hours and 57 minutes.

The latest period of the appearance of the *mature* or moving maggots was in Mackenzie's cases 76 hours, the earliest period was 24 hours and 18 minutes, and the average period was 39 hours and 43 minutes. In 6 cases it occurred in from 24 hours and 18 minutes to 30 hours, in 16 cases from 30 to 48 hours, in 11 cases from 48 to 72 hours, in 1 case upwards of 72 hours, and in two cases it was not observed.

(*d*) **Post-mortem emphysema.**—Gases distend cavities and tissues till the walls burst open and discharge their contents, and the brain runs out. These gases, developed under considerable pressure, cause various characteristic swellings and displacements of organs and their contents. Thus this gas (1) *Puffs up features*, rendering recognition increasingly difficult. (2) "Causes the eyeballs and tongue to protrude." (3) "Puffs up the tissues of the neck which become greatly swollen, accentuating the natural groove which becomes pale and exsanguine from the mutual pressure of the swollen folds, frequently giving rise to an erroneous diagnosis of strangulation. (4) Distends the abdomen, causing the body if submerged in water to float, causing the anus to gape, the fæces to be expelled, the rectum and other viscera to prolapse, eventually bursting open the body cavities. (5) Forces the contents of the stomach and lungs to escape from the mouth, often in the form of frothy and bloodstained mucus. (6) The pressure, before the abdominal wall gives way, drives the blood from the abdominal vessels into the vena cava, thence into the right side of the heart and into the lungs. Hence, other things being equal, the weight of the lungs gradually increases after death. In a large series of autopsies Powell has found the average weight of the Indian lungs to be, Left, 12½ oz.; Right, 14 oz., when the autopsy has been performed within four hours of death. Left, 17½ oz.; Right, 19 oz., when the autopsy has been performed over 18 hours after death. (7) If there be a wound on the body, whether *ante-mortem* or *post-mortem* from the nibbling of rats, insects or crustaceans, the gaseous pressure will cause

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post-mortem bleeding from the veins. This explains the origin of the ancient ordeal in which the corpse was supposed to miraculously bleed in the presence of its murderer. (8) In the case of females there may be *post-mortem* delivery of the fœtus up to the sixth month, and in cases where the os has already dilated and the female has died in labour, even a full-term child may be delivered by the gaseous pressure. The uterus in the latter case is usually turned completely inside out. In the earlier stages of pregnancy the complete uterus containing the fœtus may prolapse.

From the above description it will be seen that gaseous decomposition gives rise to conditions in the eyes, tongue, neck and anus, popularly associated with strangulation. The greatest caution must therefore be exercised in giving an opinion that death was due to strangulation if the body is first seen after gaseous decomposition has set in.

It is to be feared that many a miscarriage of justice has taken place from ignorance of the natural processes of decomposition in hot climates.

(*e*) **The softened flesh falls from the bones.**—The brain, liver, spleen, stomach, and intestines putrefy most rapidly, the heart, lungs, kidneys, bladder, and blood vessels more slowly, the last organ in women to putrefy is the uterus.

Onset and rapidity of putrefaction.—This is so rapid in the hot plains of India that it visibly begins in about 25 hours; but no definite estimate can be given of its rate of progress. In Europe in summer it occurs within 1 to 3 days after death.[1] It is hastened or delayed respectively by the following conditions, affecting the growth of bacteria or animal organisms.

(*a*) **Temperature.**—The temperature most favourable to putrefaction seems to be between 70° and 100° F., hence bodies putrefy more rapidly in summer than in winter. Low temperatures below 32° F. arrest putrefaction altogether, hence well-preserved bodies of mammoths are found buried in arctic ice after thousands of years. Temperatures over 100° F. tend to delay it, and a temperature of 212° F. arrests it entirely.

(*b*) **Access of air.**—Free access of ordinary air promotes putrefaction owing to entry of bacteria of decomposition, hence tight-fitting clothes, or a tight coffin retard putrefaction, whilst a bruised or mangled body putrefies more rapidly. Bodies putrefy more rapidly in air than in water, and less rapidly in earth than in water.

(*c*) **Moisture.**—Moisture promotes, and absence of moisture retards, putrefaction. Hence, putrefaction is more rapid in moist than in dry air and is much retarded by submersion in water, when the chemical change into adipocere may occur, see below. Bodies, however, after removal from water very rapidly decompose. 'Mummification,' see p. 91, may occur in hot dry air.

(*d*) **Condition of the body,** age and cause of death.—Putrefaction is more rapid in bodies of persons dying suddenly and in fat, flabby or dropsical bodies and in newly born children and in women dying in child-birth than in cases of death from exhausting diseases and in emaciated bodies, doubtless owing to excess of fluid in the former cases. Parts injured at the time of death usually putrefy more rapidly. The presence

[1] Casper, I. 33, 37, 40, 52.

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in the body of certain poisons, *e.g.* arsenic, antimony, chloride of zinc, and phosphorus, tends to delay putrefaction. Powell's experience is that in alcoholic poisoning decomposition is rapid.

(*c*) **Antiseptics and poisons.**—These, of course, retard putrefaction—arsenic, antimony and alcohol amongst poisons. Lime, contrary to the popular belief, retards putrefaction.

Adipocere.

Sometimes instead of the decomposition of putrefaction, the corpse may undergo the *post-mortem* change of (1) Saponification, forming *Adipocere*, or (2) Mummification.

This saponification change only occurs in the case of bodies wholly submerged in water or cesspools, or buried in deep moist graves. The substance then formed is chemically a soap of ammonia and lime, and is called 'adipocere' on account of its fat (*adeps*) and waxy (*cera*) appearance. It is probably produced by the fatty acids of the fat combining with the ammonia of the decomposed nitrogenous tissues of the body, and latterly as time goes on part of the ammonia is replaced by lime. Physically, it is a soft, waxy-looking substance, greasy to the touch, and varying in colour from a dull white to dark brown and of a disagreeable rancid odour. On fracture it exhibits traces of fibres and the blood vessels between which the soap is deposited. Its specific gravity is less than water, it melts at about 200° F., is soluble in ether and alcohol, and on heating with caustic potash it yields ammonia. It is a very permanent body and may last twenty years and upwards. The subcutaneous fat and bone-marrow first undergo this change; the normal internal organs are not often so altered.

Time required for the change.—Observers in Europe were of opinion that a low temperature by retarding decomposition favoured this change. Taylor and Casper show that adipocere has been found in bodies immersed in water from five weeks to one year, but rarely in less than three to four months, and all the soft parts had not completely undergone this change after a year's immersion. The process occurs more slowly in damp soil than in water, though in the case of a fœtus buried in a damp cellar it occurred in three weeks (Casper). The bodies of children and obese persons are more rapidly converted on account of the excess of fat, and in the former case the fat contains three times more fatty acid with less oleic acid (Langer).

In India, however, Dr. Coull Mackenzie, police-surgeon of Calcutta, has recorded eight cases (*I. M. G.*, 1889, 42) in which this change seems to have occurred *within three to fifteen days*

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after death, thus apparently disproving the theory that a low temperature conduced to this change. These cases occurred in the submerged bodies of persons drowned in the Hughli river at Calcutta, or buried in the hot damp soil of Lower Bengal.

Cases.—(*a*) A male Hindu was killed in July by the kick of a horse, and was buried the following day. Four days after burial, the body was exhumed in order that an inquest might be held. It was found in an advanced state of saponification externally, the heart and liver being also saponified. The body was buried in soft porous soil, saturated with moisture, the temperature being high, in the rainy season. (*b*) An adult Chinese woman alleged to have died in child-birth was buried in September under circumstances which necessitated an inquest. The body was exhumed seventy-six hours after interment, when it was found to be considerably saponified. Her body was buried in similar soil and temperature, and in a wooden coffin. (*c*) A young European was drowned in the river Hughli in September, his body being recovered seven days after. It was in an advanced state of saponification externally, the lungs, heart, liver, kidneys, stomach, and intestines were also saponified, and what is very curious is that the stomach contained undigested food (flesh and potatoes) of which the flesh was entirely saponified, the potatoes not being altered in the least. (*d*) A European sailor was drowned in the Hughli in October, and his body recovered eight days and ten hours after immersion, was found to have the external parts as well as the heart, liver, spleen, kidneys, stomach, intestines, and bladder saponified.

Similar experiences have been subsequently recorded[1] from Bengal, in which the body of a young Bengali woman buried in September three feet deep in alluvial soil on the bank of a pond, when exhumed three weeks afterwards was found to have undergone "apparent saponification." And in another case, the body of a boy, nine years of age, buried in a shallow grave, covered with nine inches of water, was found to have undergone this change four days after death.

For a recent thoroughly ascertained case of rapid adipocere reported by Professor Powell of Bombay and supported by chemical analysis, see Appendix VI.

Mummification, or desiccation or shrivelling up of the body, by its losing rapidly its fluids.—This occurs only in hot dry climates with hot air in motion, such as in sandy deserts, *e.g.* Sindh, Beluchistan, etc., and parts of Upper India where the bodies are perched in trees or between the rafters of a roof.

Practical Examination of the Dead Body.

The clothes of the body should be examined before removed for the detection of signs of a struggle, marks of blood, etc., to enable comparisons to be made with injuries on the body. If the clothes are removed before being seen by the examiner, *post-mortem* rigidity will be destroyed in parts, abrasions or bruises

[1] Dr. Moir, *Ind. Med. Gaz.*, 1897, p. 197, and Dr. V. Ashe, *id.*

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may be found, and even the contents of the disturbed stomach may be forced into the mouth or larynx so as to give suspicion of accidental choking. First, the general condition of these should be noted, *e.g.* whether showing marks of fire, or corrosion; or wet, or stained with blood, dirt, secretions, or excretions. The clothes, etc., should then be more particularly examined; note should be taken of any cuts or tears upon them, and of the correspondence or otherwise, of these with wounds on the body. Any peculiarities of the clothes, or of the ornaments found on the body, likely to aid in establishing its identity, should also be recorded.

External Examination of the Body itself.

For this the clothes should be taken off, and any marks resembling bruises washed to make certain that it is not dirt or external stains. In India, dead bodies are often submitted for examination in an advanced state of decomposition. Such bodies should nevertheless be examined externally, and as far as possible internally also; the fullest possible examination of the body should invariably be made, not necessarily for report to magistrate, but for inclusion in your own notes for reference, and to establish your own opinion. The plan of making a partial examination is only admissible when the body is extremely putrid and decomposed; but even in such cases, although the medical officer is at liberty to decline to make an internal examination of highly putrid corpses, some distinct evidence as to how death was caused may often be obtained, as for example, when this has been the result of wounds, fractures, or other violence, or of the administration of certain poisons; besides the condition of the uterus might give vital information, and the presence of solid fæces in the gut would negative alleged death from cholera.

External examination of the body should include a search for—

1. **Signs indicating the Time elapsed since death.**—That is, whether the body is warm or cold, its condition as regards rigidity, and the extent to which putrefaction has advanced. It is possible that an estimate formed as to the period which has elapsed since death may bear greatly on the question of (*a*) the identity of the body, and (*b*) the guilt or innocence of accused persons (see case below).

The question of how long a body has been dead is sometimes of the utmost importance in cases of murder where accused pleads an *alibi*.

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The advanced state of putrefaction of a body may show, for example, that death must have occurred at a period considerably anterior to the date of disappearance of the individual whose body it is alleged to be; or as in the following case of Gardner the condition of the body of a murdered individual may show that death must have taken place at a time when the accused had access to the victim, and not subsequently to the time of termination of such access.

Case.—**Time of murder** indicated by condition of body.—Gardner, the sweep.—Gardner lived with his wife and another woman, their servant. The wife was found dead in her bedroom, with wounds on her throat, at 8 a.m. Her extremities (which were uncovered) were cold, and rigidity was well marked. The circumstances of the case conclusively indicated murder, and Gardner was suspected and brought to trial. Gardner was proved to have left the house on the morning of the murder at 4 a.m. and was absent until after 8 a.m. The defence alleged that the woman was murdered during Gardner's absence. The medical witnesses in the case gave it as their opinion that, from the condition of the body when first seen at 8 a.m., it was clear that the woman had been dead more than four hours. Hence she must have died before Gardner left the house. This and the other evidence in the case led to the conviction of the prisoner.—Taylor, *Med. Jur.*, I. 83.

See also case of Sudhabode Bhattacharji.

Any estimate, however, based on *post-mortem* examination must necessarily be only approximate. You should consider especially the following points:—

(*a*) **Temperature of the body.**—In the tropics where the temperature of surrounding objects is but little above that of the body the latter 'cools' in a few hours. Observations in temperate climates show that the dead body cools down to a temperature a little above that of the external air in fifteen to twenty hours, the fall of temperature being more rapid in the earlier than in the later hours after death.

(*b*) **Conditions of the muscles.**—If these are relaxed and contractile it is probable that not more than $1\frac{1}{2}$ to $1\frac{3}{4}$ hours in the plains or 3 to 6 hours in the hills have elapsed since death. If rigid, probably more than 3 and less than 36 hours have elapsed in hills; for plains see table, p. 85.

(*c*) **Amount of putrefaction.**—Other things being equal, the greater the amount of this the longer the period which has elapsed since death. The rapidity of putrefaction, however, varies so greatly with the circumstances already detailed that no general rule can be laid down for estimating by its amount the length of time which has elapsed since death occurred.

2. **Marks of violence,** or other external marks indicative of the cause of death.—Note if there are any **stains of blood,** or other matters, on the surface of the body. In the case of blood stains, it is specially important to note their situation and form, as this may show that they have been produced by some individual other than deceased, *e.g.* the impress of a right hand

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on the right hand or forearm of the body or abrasion from violence (finger or other pressure, falls, etc.). Examine for marks of powder-grains or burns of powder in gun-shot wounds; marks about mouth (poison or suffocation); marks of a hypodermic syringe; burns, however trivial. Specially search for bloody thumb- or finger-prints (see p. 56). Note whether or not *cutis anserina* [1] is present, and whether any matters are sticking under the nails. Note whether the features are pale and natural, or livid and swollen, the condition of the eyes, and position of the tongue, and whether or not this shows marks of injury from the teeth. Examine the orifices of the body for presence of foreign bodies, marks of concealed punctures, and marks of corrosion, and note the nature of any fluid oozing from them. Examine, at first without dissection, the whole body for wounds or contusions, not omitting to examine by palpation the bones for fractures and to search for marks of concealed punctures under the breasts, scrotum, and eyelids, and in the armpits and nape of the neck, and, in the cases of infants, in the fontanelles, and along the whole course of the spine.

Then, employing such dissection as may be requisite, note in regard to all **wounds, fractures or other marks of injury** : (1) Exact situation.—This should be recorded with reference to some fixed point on the body, *e.g.* distance of a wound in inches from the top of the pubis or sternum, angle of the jaw, etc.; position, with reference to hyoid bone or laryngeal cartilages of a ligature mark on the neck, etc. (2) Exact dimensions, *e.g.* measured in inches, the length, breadth, and depth of wounds, breadth of ligature marks, etc. (3) Direction, *e.g.* in a punctured wound, whether it is directed from above down or below up, and whether from right to left or left to right; and in incised or other linear wounds or marks of injury, whether or not one end is higher than the other, and, if so, whether the upper end is anterior or posterior to, or to the right or left of, the lower. In the case of certain fractures, *e.g.* of the ribs, note whether the broken ends of the bone have been driven inwards or outwards, by the violence used to cause the fracture. (4) Appearance, and how far this indicates (*a*) the method, and (*b*) the time, of their production. Under (*a*) note, in the case of wounds, whether the edges are contused or lacerated, or apparently clean cut, and in the latter case examine them with the aid of a lens for signs of tearing, or appearance of inversion, indicative of production by a blunt weapon. Note the general shape of any wound, contusion, or burn; this may indicate the shape of the weapon or heated object which has been used.

[1] Goose-skin, see 'Drowning.'

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In the case of an *incised* wound, compare the appearance of the two ends of the wound, with the view of ascertaining the direction in which the cutting instrument was drawn in producing it. In gunshot wounds, if two orifices exist, compare their appearance, noting any characters indicating one or other to be the orifice of entry or of exit. Note also whether or no any blackening or marks of gunpowder exist round the wound. Examine any wound for the presence of foreign bodies, preserving such as may be found. Under (*b*) note, in the case of wounds, whether or no the edges are retracted or averted, and whether or no blood or blood clots are present in the wound, or signs of inflammation exist around it. In the case of apparent contusions, note if the skin over them is abraded; examine the edge of the contused surface for changes of colour, and, *by* dissection, ascertain if the underlying tissues contain extravasated blood so as to distinguish ecchymosis from cadaveric lividity. In the case of ligature marks also, the condition of the tissues underlying the mark should be ascertained. If the injury is a burn note the presence or absence of vesication about it, or of a line of redness, or signs of inflammation around it.

Bear in mind, while conducting the examination, the characters which distinguish *ante-mortem* from *post-mortem* wounds and burns (*q.v.*). Recollect, also, that under certain circumstances putrefactive changes may simulate signs of strangulation. There may, for example, be protrusion of the tongue, due to such changes; and putrefactive swelling against a string loosely tied round the neck, may result in the production of a depressed mark, somewhat similar to that left by the ligature in death from strangulation.

In infants the external examination should, in addition, include examination for (1) degree of maturity, namely, length and weight, condition of the eyes, condition of the skin, nails, and scalp hair, and position of the middle point of the body and (2) live birth, or the reverse, *e.g.* exfoliation of the scarf skin, condition of the umbilical cord, presence of signs of intra-uterine maceration (see 'Infanticide').

III. **Internal Dissection of the Body.**

After the external examination has been fully made, the internal examination by dissection should be performed as thoroughly and as soon as possible.

Preliminaries.—The warrant or authorization to perform a dissection should always be taken to the examination, and on

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one should be present at the examination out of mere curiosity unless authorized, and it is desirable that the examination should be made in daylight without artificial light, though in hot climates one cannot wait for daylight. Complete notes should be made during the dissection, and all measurements accurately determined. Injured parts, diseased organs or portions of them, if necessary, and all foreign bodies should be removed and preserved for further examination. All necessary instruments, bottles, rubber gloves, antiseptics, etc., should be provided before commencing the dissection.[1]

Examination should be complete.—Even if the condition of the parts first examined appears sufficiently to account for death, the remainder of the body should nevertheless be examined, so that you may be in a position to say, not only what was, but also, as far as possible, what was *not*, the cause of death.

Cases are on record, in which a complete *post-mortem* examination of a body has disclosed indications of a cause of death other than that indicated by the conditions of the parts first examined. The appearances first noted may, for example, indicate that death was due to mechanical violence, or to drowning, and yet, on further examination, indications may be found of death from poison (*q.v.*). Or again, the appearances first noted may indicate death from hanging, and yet further examination may show that death was due to strangulation (*q.v.*), or to mechanical violence (*q.v.*), and that the appearance indicative of death from hanging have been fabricated in order to make the case seem one of suicide. Again, if the *post-mortem* appearances show clearly that death was due to a particular lesion, your examination is not complete unless you have noted all particulars which may assist in arriving at an opinion as to whether the fatal lesion was the result of disease or of violence, and if the latter, whether the violence was accidental, suicidal, or homicidal. It has happened that in cases where the medical reports have shown that death was caused (1) by injury to the head, and (2) in case of a woman by strangulation, it was subsequently found that in the first case the ribs were crushed, and in the second, rape had been committed.

Order of making the examination.—If on the surface of the body marks of violence exist of such a nature as to indicate injury to the organs contained in any particular cavity, that cavity **should be first dissected,** and the exact effect of the violence ascertained. Incisions made through the skin for this purpose should avoid wounds likely to have penetrated

[1] In plague autopsies the operator risks fatal inoculation.

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the cavities underlying them, so that there may be no interference with the subsequent tracing of the exact course of the wound. In other cases, where a particular cause of death is *suspected*, that cavity should be first dissected in which appearances indicative of the cause of death are most likely to be found, *e.g.* in cases where it is suspected that death has been due to asphyxia, the thorax, and in cases of **poisoning** the abdomen, should be the cavity first dissected.

In cases where the cause of death is **doubtful,** the three chief cavities of the body should be dissected in the following order: (1) head, (2) thorax, and (3) abdomen; the **spinal cord** should be examined in suspected poisoning by strychnia, or some other of the alkaloids, in tetanus, and where there have been symptoms of spinal irritation or inflammation.

In all cases, before opening and dissecting the thorax, the cavity of the abdomen is to be opened, and (without further dissection) the position of the diaphragm, and general appearance of the contents of the abdomen ascertained. Should this preliminary inspection indicate that the cause of death is connected with the abdominal viscera, dissection of the abdomen should be proceeded with; if not, it should be reserved until after the thorax has been dissected.

The **details and method** of making the Necropsy are given in Appendix III. Remember that the more important viscera for examination after the brain are those of the thorax (the heart and lungs), then those of the abdomen, preserving in cases of **suspected poisoning** the contents of the stomach and intestines, and also large portions of the liver, spleen, and kidneys as detailed under 'Poisons.' In infants the examination should be directed not only to ascertaining (1) the cause of death, but also (2) the degree of maturity, and (3) whether or not it survived its birth (see 'Inheritance,' question 6, and 'Infanticide').

Opinion on cause of Death.

No opinion should be given as to the cause of death that is not fully warranted by the appearances observed. If in any case where, on *post-mortem* examination, you may fail to discover appearances sufficient to account for death, a negative opinion only should be given. You are not justified in reporting the death as due to 'natural causes' or 'heart failure'[1]

[1] This phrase is too frequently a cloak for ignorance; there would be no inquest if the heart had not 'failed.' If you find valvular disease or degeneration of the heart muscles, say so. If you can find no evidence of violence or cause of death, say so.

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simply because you have failed to find *post-mortem* appearances indicative of death from a non-natural cause. Again, you may find that death was due to a lesion, such as an effusion of blood into the substance of the brain, which may either have been the result of violence or of disease, and the *post-mortem* appearances may do no more than indicate that the fatal lesion was more probably the result of one than of the other. In such a case your opinion should be a guarded one, and be accompanied by the reasons which lead you to consider it to be more probable that death was due to disease or to violence, as the case may be.

The results of the examination should always be duly recorded at the time and on the spot, in a note-book kept for the purpose.

Death Certificates without Post-mortem Examination.

In respect to death certificates the State has entrusted the medical profession with very grave responsibilities, and it behoves every member of the profession to discharge these responsibilities honestly and honourably. The issue of every death-certificate should be regarded by the certifying medical man as a very serious responsibility, and it is especially so whenever there is the slightest suspicion that the death may be unnatural. Those deaths that are obviously "violent and unnatural deaths, or sudden deaths of which the cause is unknown," must immediately be notified to the coroner, or the magistrate who in India performs the duties of coroner, and become the subject of his inquiry or inquest, in the course of which a *post-mortem* examination is usually made before a death-certificate is granted. All other deaths that occur are not so notified, but amongst them is always a considerable proportion with an element of legal doubt, in which a certificate cannot honestly be given without an autopsy. How are these cases to be dealt with?

If the doctor has strong and, as he believes, well-founded suspicion that the death is unnatural, he should report to the coroner or police-surgeon at once without hesitation.[1]

If there is only a slight suspicion (and it is desirable in the public interest that medical men, although not criminal

[1] Cf. F. J. Smith in *Trans. Med. Leg. Soc.*, 1912, pp. 56 *et seq.*, from whose important article much of this is abstracted. Also Dr. W. Westcott, *ibid.*, pp. 64-67, on the Coroner's control of all autopsies. In England "no one but a coroner can legally order a *post-mortem* examination; no magistrate or justice can do it, and a judge could only do so by order of a coroner to hold an inquest."

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detectives, should cultivate a certain amount of wholesome suspicion or detective acumen in regard to deaths) he may do one or other of several things. He (1) may get permission for an autopsy and do it, on which he may be able to certify or may have to report to the coroner, (2) he may be refused the autopsy on which he may refuse to certify, or may still certify conditionally, which is a weak move, or (3) he may report his suspicions to the coroner or magistrate without asking for an autopsy.

For example, a frequently recurring difficulty in regard to a death-certificate is when a patient who has been treated for chronic disease (*e.g.* Bright's, heart trouble, bronchitis, phthisis, etc.) dies suddenly a considerable time after the doctor has ceased to visit him, and the former is asked to sign the certificate.

The question arises, at what length of time after his last visit in such a case is a doctor justified in giving a certificate and when is it justifiable? One way out of the difficulty is for the conscientious medical attendant to *refuse a certificate* of the ordinary character, but offer to write a letter to the registrar entering fully into the circumstances of the case, and if he accepts this your responsibility is halved. The 'circumstances' which will vary in detail must contain the following: (1) date and duration of your attendance upon the deceased and your views of his illness at that time; (2) the circumstances under which and the reasons why (*a*) you ceased attending then, and (*b*) you have not recently been in attendance; (3) the circumstances known to you about his home-surroundings—poverty, wealth, attitude of relations, and anything you may have heard from neighbours; (4) any efforts you may have made to obtain an autopsy, and the mode and manner in which these suggestions have been refused; and details you may care to impart to him respecting the close of his life, which from your own professional knowledge and experience may have led you to regard his death as natural or unnatural. Whatever action the registrar may take on this letter, it remains evidence of reasonable care on your part.

The only other solutions are two, namely, (1) swallow all scruples and fill up a certificate, taking care that your dates are scrupulously exact, put in the wholly objectionable words "as I am informed" (but see below) and let the registrar take what steps he likes; and (2) refuse point blank to certify or write, and then all responsibility rests between the registrar and coroner. The circumstances which compel you to one or other of these extreme procedures depend on the individual conscience and the local colouring of the case.

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If you decide to give a certificate without a *post mortem* you should observe the following points :—

(1) Re-read carefully immediately before writing the certificate the printed instruction thereof.
(2) Remember if you refuse a certificate without reasonable excuse you are liable to a fine—'reasonable excuse' here can only mean (*a*) Cases of uncertainty as above discussed, (*b*) Illness or accident on your own part sufficiently severe to render you incapable of writing or signing your name; (*c*) Bodily absence on your part necessitated by professional urgency. It *cannot mean* the non-payment of the bill for attendance or any question of personal feeling between yourself and the deceased or the messenger who comes for it.
(3) Never *under any circumstances whatever* give a duplicate certificate, for a medical death-certificate is an original document accepted without question by registrars and undertakers, and a surplus one may and has been used for felonious purposes to perpetrate or hush up a crime.
(4) Only the man who was actually in attendance may sign the certificate; no one is authorized to sign on his behalf.
(5) Never sign a certificate in blank to be filled in by even a qualified person. It is grossly dishonest, illegal, dangerous, and deserves heavy punishment when found out.
(6) Write legibly.
(7) Use the names of diseases in the "Nomenclature of Diseases."
(8) "As I am informed," does not occur in the Act. The use of these words by an *honest* medical man in a death-certificate is inconceivable, as they are in direct antithesis to the very idea of a death-certificate, which means certain fixed positive knowledge, and hearsay is not recognized as such in law.
(9) The distinction between 'primary' and 'secondary' is a mere technical difficulty which can cause little more than temporary embarrassment, when it is remembered that 'primary' here simply refers to time, and the certifier can use his discretion as to how far back he should go.

On the other hand, when there is the slightest suspicion that the death has been unnatural, and this includes not merely deaths by obvious and suspected personal violence, foul play, poison, criminal abortion, etc., but also by operative interference,

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anæsthetics, and all sudden deaths of which the cause is unknown, it is clearly the duty of the medical man to report to the coroner or to the magistrate who in India takes his place; or to try all fair means of persuasion to get permission for an autopsy, and failing this to report to the coroner or magistrate. Any private or unauthorized dissection of the body which may have the effect of hiding a criminal offence or culpable negligence renders the operator liable to be made an accessory to the fact should any question of foul play or malpraxis subsequently arise.[1]

Exhumation.

This unpleasant task becomes necessary occasionally where a suspicion of poisoning or other foul play arises some time after the death; or it may be for purposes of identification, as in the case of the body alleged to be that of Livingstone, where identification on disinterment was made by the arm showing a badly united fracture, such as the deceased was known to have had.

Case.—**Druce-Portland Case. Identification after 43 years' burial.**—In this case, in 1907–08, a person named Druce claimed to be a son of the 5th Duke of Portland, who was not known to have been married. It was alleged that that eccentric duke led a double life, in one aspect of which he posed as Thomas Charles Druce, carrying on business as an upholsterer in Baker Street, London. Thomas Charles Druce was twice married, and had a family by each wife; and it was alleged by this grandson who claimed the Portland title and estate that the reputed death and burial of T. C. Druce, in 1864, at the age of 71, was a mock one, and that the coffin contained merely lead. Under the orders of the police magistrate, Mr. Plowden, the vault at Highgate cemetery was opened, and the undisturbed and intact lead coffin was found to contain the body of an old man, who was readily identified as T. C. Druce. The well-preserved state of the body, after so many years' interment, was remarkable. The features were clearly recognized by previous acquaintances, and by comparison with photographs taken during life. "The head was covered with scanty, reddish-brown hair, somewhat whitened, parted neatly on the left side, and brushed slightly over the forehead; the eyebrows thick and wavy, a moustache reddish-brown dropped straight over the upper lip, also whiskers and a beard. The skin was only broken in one part of the body, the lower abdomen, where there were indications of gangrene."

In India, the practice of swift cremation of mortal remains upon the very day of death, which is prevalent amongst the more orthodox Hindus, who form the majority of the population, necessarily restricts the frequency of exhumations in this country, where earth-to-earth burial is mostly limited to Mohammedans, non-Hinduized aborigines, and Europeans.

[1] Dr. Wynn Westcott, *loc. cit.*, p. 66.

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In exhuming a body it is desirable that a medical officer be present from the commencement, also any relative or acquaintance of the deceased person who can identify the corpse; and if buried in a coffin, the carpenter who made the coffin should be present. The examination must be made in daylight, preferably the early morning. Disinfectants or deodorants should be ready, and should be sprinkled around but not upon the body itself. If the coffin is broken, and in cases where there is no coffin, some of the earth above and below the body should be taken and preserved in cases of suspected poisoning for analysis.

The body should be exposed a short time before inspection to allow effluvia to escape, and the observer should stand on the windward side. The stage of putrefaction should be noted.

In recent interments the usual *post-mortem* examination should be made as far as possible. In the external inspection a sample of any characteristic hair on the face should be preserved for identification. After examining the bodily cavities, the stomach and its contents, also contents of bowels, also the liver, spleen, and kidneys should be preserved and sealed in clean bottles for chemical analysis as detailed in appendix. All injured parts should also be removed and preserved when practicable. When a long interval has elapsed since burial, injuries to the bones, especially the skull, and in women to the uterus (which longest resists putrefaction) should be looked for; and where mineral poison is suspected a long bone, *e.g.* the femur, and the earth from the region of the abdominal cavity, should be preserved for analysis.

Limit of time for exhumation.—There is practically no limit of time in English law to the utility of an exhumation. For so long as the bones remain these may afford valuable evidence by which the innocence of suspected persons may be proved, or, on the other hand, the exhumation may prove murder by arsenic or other mineral poison. The Druce case, above noted, shows that the identity in an ordinary vault in a temperate climate may remain clear for upwards of half a century.

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CHAPTER IV.

ASSAULTS, WOUNDS, INJURIES, AND DEATHS BY VIOLENCE.

'ASSAULTS' and *wounds or 'hurt'* form the greater portion of the cases coming under the medical officer's notice, and sometimes give rise to questions of much complexity; and medical evidence is especially required in cases where the injuries result in death.

Every attack upon the person of another is an **'assault,'** whether it injures physically or not; and no provocation by word spoken or written can justify an assault, although it may somewhat mitigate the offence. Beating or wounding constitutes **'battery,'** which includes the slightest touch of the finger. Throwing a stone at a person, but missing, constitutes 'assault,' whilst throwing and hitting is assault and battery.

The legal conception of a **'wound'** is much more extensive than the surgical, which latter restricts the term to an injury accompanied by a breach of the skin, and excludes contusions, simple fractures of bones, and ruptures of internal organs. To obviate the use of this ambiguous term, and in view of the necessity for defining whether any particular injury is or is not a 'wound,' is not defined by the Law; but the statute employs the terms **'hurt'** and 'grievous hurt.' Simple 'hurt' is thus defined:—"*Whoever causes bodily pain, disease, or infirmity, to any person is said to cause hurt*" (*I. P. C.*, s. 319).

9 **Grievous hurt.**—The medical officer is often required to decide whether an injury is 'hurt' or '*grievous* hurt.' serious

The following kinds of '*hurt*' are designated as '*grievous* hurt' (*I. P. C.*, s. 320).

(1) Emasculation; (2) permanent privation of the sight of either eye; (3) permanent privation of the hearing of either ear; (4) Privation of any member or joint; (5) destruction or permanent impairing of the powers of any member or joint; (6) permanent disfiguration of the head or face; (7) fracture or dislocation of bone or tooth; (8) Any hurt which endangers life or which causes the sufferer to be during the space of

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twenty days in severe bodily pain or unable to follow his ordinary pursuits.

Sometimes the healing of a simple wound of the scalp, etc., is deliberately delayed or prevented for twenty days so as to bring the severer penalty under this clause; so this possibility should be kept in view.

When an act done by another has caused 'grievous hurt,' or 'hurt,' the doer of the act may be charged with the offence of voluntarily causing 'grievous hurt,' or 'hurt,' as the case may be; or according to the circumstances of the case, with the graver offence of 'attempting to commit **murder**' (*s.* 307), or 'culpable homicide' (*s.* 308), and causing hurt in such attempt.

The kind of weapon used affects the gravity of the offence. Thus, by *ss.* 324 and 326 (*I. P. C.*), the causing of hurt or grievous hurt by certain specified means is made an offence more severely punishable than when such means have not been used. Amongst the means thus specified are "any instrument for shooting, stabbing, or cutting, or any instrument which, used as a weapon of offence, is likely to cause death."

Deadly injury.—If an act done by another results in **death,** the doer of the act may be charged with the offence of committing 'culpable homicide,' or of "causing death by a rash or negligent act."

Culpable homicide (a Scottish term, the English equivalent is **manslaughter)** is defined in *s.* 299 of the *I. P. C.*,[1] and the

[1] Section 299 of the *I. P. C.* is as follows :—"Whoever causes death by doing an act with the intention of causing death, or with the knowledge that he is likely by such act to cause death, commits the offence of culpable homicide.

"Explanation 1. A person who causes bodily injury to another who is labouring under a disorder, disease, or bodily infirmity, and thereby accelerates the death of that other, shall be deemed to have caused his death.

"Explanation 2. Where death is caused by bodily injury, the person who caused such bodily injury shall be deemed to have caused the death, although by resorting to proper remedies and skilful treatment the death might have been prevented.

"Explanation 3. The causing of the death of a child in the mother's womb is not homicide. But it may amount to culpable homicide to cause the death of a living child if any part of that child has been brought forth, though the child may not have breathed or been completely born."

With reference to Explanation 2 of the above section, it may be pointed out that it has been decided in England that when a wound has been given "which in the judgment of competent medical advisers is dangerous, and the treatment which they *bonâ fide* adopt is the immediate cause of death, the party who inflicted the wound is criminally responsible" (*R.* v. *Pym*, 1 Cox, C. C. 339; see Mayne's Penal Code 2, *s.* 255). This decision, it will be observed, goes farther than Explanation 2, *s.* 299. Explanation 2 covers all cases where death is due to the effect of neglect or unskilful treatment acting on the injury, but not, like the decision quoted, a case where death is not due to the injury, but to an unnecessary operation undertaken for its cure.

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accused may be convicted of this offence even if death followed as **an indirect** result of the injury (see *s.* 299, Explanations 1 and 2).[1] Culpable homicide, according to the circumstances of the case, may or may not amount to murder. Again, when a person has committed suicide, any one who has abetted him in doing so is punishable under *ss.* 305 or 306 of the *Code.* By *s.* 305 abetment of suicide may be punished with death, if the suicide was under eighteen, or was insane, delirious, or intoxicated at the time. Attempts to commit murder, or culpable homicide, are punishable under respectively *ss.* 307 and 308 of the *Code,* and attempts to commit suicide under *s.* 309.

Death or hurt caused by a **Rash or negligent act.**—Where a person has caused the death of another by an act not amounting to culpable homicide, he may be charged with the minor offence of "causing death by a rash or negligent act" (*s.* 304A). Similarly where a person causes hurt or grievous hurt to another, under circumstances which do not amount to '*voluntarily* causing hurt' (*I. P. C.,* 321, 322), he may be charged with the minor offence of 'causing hurt' (*s.* 337), or 'grievous hurt' (*s.* 338), by doing an act "so rashly or negligently as to endanger human life or the personal safety of others." In cases such as these, besides the main question, namely, has the injury caused, or is it likely[2] to cause 'death,' 'grievous hurt,' or 'hurt'? a subsidiary question may also arise, namely, is the character of the injury such as to indicate intention, or absence of intention, to cause a particular result?

Examination of 'Hurt' and Wound cases.

The police bring to the medical officer with the individual to be examined a printed form with the undernoted headings

[1] In India the question, has a certain injury caused death? arises irrespective of the period intervening between the receipt of the injury and death. By the law of England, a person is not deemed to have committed homicide if this period exceeds a year and a day (inclusive of the day of receipt of the injury). This provision does not appear in the Indian Penal Code. Mayne, however (Penal Code, p. 265), thinks that it would possibly be acted on in India as a matter of evidence.

[2] It may be remarked that the opinion of a medical expert may be required on the point whether an injury which has caused death is one which comes under the description of an injury "sufficient in the ordinary course of nature to cause death" (Penal Code, Sec. 300), or one which comes under the description of an injury "likely to cause death" (Sec. 299, *i.e.* whether the injury is one from which death would most probably result, or one from which death would only be a likely result. In the case of *Reg.* v. *Govinda* (1 Bom., 342), Melvill, J., held that under certain circumstances the infliction of an injury which causes death amounts to murder if the injury is one falling within the first of these two descriptions; but only to the minor offence (culpable homicide not amounting to murder) if it falls within the second.

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to be filled up, and a note giving what the police state is 'all that is known of the case,' which is usually very meagre.

1. Nature of injury, *i.e.*, whether a cut, or bruise, or a burn, etc. etc.	2. Size of each injury in inches, *i.e.*, length, breadth, and depth.	3. On what part of the body inflicted.	4. Slight, serious, or dangerous.	5. By what kind of weapon inflicted.	Remarks.

The commonest weapon used in inflicting 'hurt' is the *lathi* or staff of solid bamboo, which is used in about 32 per cent. of all assault cases in Bengal, and which being often bound with iron becomes a 'deadly weapon.' For the possibility of serious and even fatal injury without external marks of violence, see p. 113.

Besides filling in this form the medical officer should record in his own notes the detailed results of a thorough examination of the injuries with the view of answering all the various questions that may arise as previously mentioned. For the detailed **Examination of wound cases** see p. 113.

Kinds of Wounds and Hurts and their Weapons.

Wounds are usually described as:—(1) *incised*; (2) *contused* and *lacerated*, including *bruises* (contusions) and *gunshot* wounds; and (3) *punctured*. To these may be added (4) internal injuries without any visible wound or visible breach of continuity of skin.

1. **Incised wounds**.—In examining an apparently incised wound with the object of ascertaining the kind of weapon, if any, used in producing it, it is important to note (1) the situation of the wound, (2) the appearance of its edges, and (3) its length and depth in different parts.

(1) **Situation**.—An apparently incised wound situated on a part where the skin closely overlies a bone, or sharp ridge of bone, may be produced without a weapon or by a blunt weapon. Blows with the fist, for example, over sharp ridges of bone such as the chin, or orbital ridge, or blows with a club on the scalp, may produce wounds closely resembling incised wounds.

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Wounds caused in this way are generally, but not invariably, vertical to the bone.

(2) **Edges.**—These should be examined with a lens. Sharp, clean cut, uninverted edges, indicate the use of a sharp-edged weapon; tearing and inversion indicate the employment of a blunt weapon, or production without a weapon.

(3) **Length and depth.**—Long incised wounds indicate the use of a sharp-edged weapon, and may either be caused by a single blow from one with a long, tolerably straight edge, such as a sword, or by a drawing cut from one with a short edge, such as a razor. In the former case, the method of production is often indicated by the underlying bones being clean cut through; and in the latter by the wound tailing off at one end into a superficial scratch (see also (1) kind of weapons, (2) direction of the wound).

The **Weapons** in **Incised** wounds.—The axe or hatchet class usually produce comparatively short incised wounds; either deep, or accompanied by indentation and extensive fractures of the bones beneath. Cutting instruments with a concave edge and projecting point often cause linear wounds resembling a punctured wound at one end gradually decreasing in depth towards the other end. Or if the wound has been inflicted on a curved surface, the puncture caused by the point, and the incised wounds caused by the edge, may be separated by an unwounded portion of the skin.

Weapons of assault, more or less commonly used in India, sharp-edged, and producing incised wounds, are (1) short-edged light weapons, such as the razor (*ustara*) and the knife (*churi*); or (2) heavy short-edged weapons of the hatchet class, such as the axe (*kulhāri*) and the *garasi*, *gandasa*, or *tarash*, an axe-like weapon with a long handle, and sacrificial knife (*khanda*). Weapons allied to this class are the hoe-spade (*phaora* or *kudāli*) and the Gurkha *kukri*, a short, heavy, convex-edged sword. McLeod also mentions as belonging to the spade class the *khurpa*, or grass-cutter's knife. (3) Long-edged weapons, represented by the curved sword (*talwar*), or the straight sword (*kirich*); and curved-edge weapons with a concave edge and projecting point, such as the bill-hook (*dao*, *koita*) and the sickle (*haswa*, *daranti* or *ela*). Wounds caused by broken glass or china resemble incised wounds—one would search for bits of glass, etc.

2. **Contused and lacerated wounds.**—These are often the result of injury by means other than the employment of a weapon. Thus they may result from (1) Injuries by broken glass—broken-glass wounds, however, if slight, are apt to resemble incised wounds; (2) Falls on some projecting, more or less sharp object; (3) Injuries from wild animals; or

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(4) Machinery and railway accidents. Severe contused and lacerated wounds are often accompanied by very little hæmorrhage due to (*a*) shock or (*b*) bursting or crushing of vessels.

Slight non-accidental lacerated wounds, produced without a weapon, may be the result of injuries inflicted in forcibly tearing out ornaments, or by the teeth or nails. If a wound of this class has been produced by a weapon, and much contusion or laceration is present, the indication, of course, is that a rounded or blunt-edged weapon has been used. Sharp-edged knives, it should be noted, if used with considerable force, cause bruising and laceration of the parts divided.[1]

Gunshot wounds resemble contused and lacerated wounds in character, and indicate, of course, the employment of a firearm, but not necessarily the discharge therefrom of a hard projectile. If the wound is single, it may have been caused by a firearm loaded with powder and wadding only, if the weapon has been discharged near the body. Nearness of the weapon to the body at the time of discharge is indicated by blackening of the skin from the gunpowder, except with cordite and modern gunpowder, or by scorching, charring, or blackening of the clothes at the seat of injury. A single wound, however, may be caused by a firearm loaded with a hard projectile, which in such a case will usually be found lodged in the wound, though a bullet may be so deflected by a bone, etc., as to pass round and out again by the entrance wound. Two orifices caused by the same discharge, indicate the employment of a hard projectile. When two orifices are present, the orifice of entry will usually be found to be smaller and more depressed than that of exit, which latter is usually ragged and everted. More than two orifices may be caused by one projectile, *e.g.* when this has entered the body after traversing a limb, or has split up against a sharp ridge of bone into two pieces, each finding a separate exit; or more than one orifice of exit may be caused by an intact bullet and a splinter of bone punched off by it. A wound in the neck, produced by a thrust with a "pointed perfectly circular bamboo," was mistaken for a gunshot wound.

In the case of a shot-gun wound, if the distance from which the gun is fired is within 12 inches, the wound will, as a rule, be single, while beyond this each shot will make a separate wound,[2] but it will depend also on the charge, size of shot, bore of weapon, and whether 'choke' or cylinder. A single pellet of shot may cause death by penetrating the aorta, or the brain through the eye. Fatal wounds may be caused by

[1] Ogston's *Lects. on Med. Jur.*, p. 420.

[2] Casper, I. 266.

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gunpowder and wadding alone if fired within about 4 inches from the body.

Contusions or bruises.—Under this term are included all degrees of injury produced by blows, kicks, or sudden pressure from explosions where the skin is not divided, ranging from a simple *bruise* on the surface of the body to one accompanied by fracture of underlying bones and rupture of internal organs.

In almost all contusions there is more or less extravasation of blood into the tissues constituting ecchymosis. The amount of blood effused is not entirely determined by the severity of the blow, but to some extent by the looseness of the particular tissues at the site of the blow, and by the condition of the blood of the individual, or the extensive effusion from a blow on the eye, and the bruises produced by a comparatively gentle grasp on flabby women with thin skins.

Ecchymosis shows itself as a dark, dull reddish-blue discoloration of the skin, which in about twenty-four hours begins to change colour, becoming lighter, and changing in tint to violet, then to green, and lastly to yellow, and finally disappears altogether in about five or six days. These changes in colour commence at the circumference of the patch, are due to varying degrees of solubility of the pigments into which the hæmoglobin breaks up, and to dilution of the effused blood by the serum of the cellular tissue and subsequent absorption, and occur only during life.

Superficial ecchymosis.—This appears within a few minutes after the injury, and is first of a bluish-black colour. When fading it passes through the chromatic changes from the periphery of zones of brown, green, and yellow, due to changes in the hæmoglobin.

Deep ecchymosis.—This may not appear on the surface for several days after the injury, and not always directly over the site of injury. Where there is yet no discoloration of skin, the effused blood may be detected by palpation.

Ecchymosis (*a*) may occur at a distance from the spot to which violence has been applied, *e.g.* at the seat of fracture of a bone broken by indirect violence; (*b*) may occur in spots (petechiæ), and as large extravasations indistinguishable from bruises, but without violence in some diseases, *e.g.* scurvy, and some cases of snake poisoning; (*c*) other things being equal, is in amount less, the better the bodily condition of the individual injured, and greater the looser the texture of the skin at the seat of injury; lastly, (*d*) its disappearance during life is apt to be extremely slow in old persons; is more rapid the better the bodily condition of the sufferer. After death, it may disappear from, or be masked by decomposition, or the application of antiseptic agents (*e.g.* charcoal) to the body.

It may be absent in moral injuries, especially when the violence has been applied to a yielding part, *e.g.* the anterior abdominal wall, as by a blow or kick, or the passing of a cart-wheel over the body. In the absence of ecchymosis, the fact of the existence of an internal injury caused by

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external violence is, during life, a matter of surgical diagnosis. After death, the existence of an internal solution of continuity may be ascertained by dissection, and, in the absence of ecchymosis, its connection with external violence is sometimes indicated by bruising of the parts lying between it and the surface. If such bruising is absent, as well as ecchymosis, the question whether or no the solution of continuity discovered has been caused by external violence, may be a difficult one to decide, requiring consideration of points such as (*a*) the freedom, or otherwise, from disease of the affected part; (*b*) the situation of the affected part, and its degree of liability to rupture from causes other than external violence;[1] and (*c*) the history of the case.

Cadaveric lividity, discoloration of the skin due to *post-mortem* staining may, to a certain extent, simulate ecchymosis, especially when this, owing to the pressure of a sheet or other covering on the body, occurs in stripes resembling marks of flogging. It, however, (*a*) affects dependent parts; (*b*) is usually of great extent; and (*c*) is unaccompanied by extravasation of blood. An incision through the skin and examination of the underlying cellular tissue, therefore, will always disclose the true nature of the discoloration. Attempts are sometimes made to simulate ecchymosis by applying marking nut juice, or some other irritant, to the skin; such applications, however, usually produce blistering, or a papular eruption, easily distinguished from ecchymosis.

The weapon in contusions.—If a weapon has been used, it will probably have been a blunt or rounded one, such as a stick or club. Frequently the shape, etc., of the weapon or instrument employed can be inferred from the shape and situation of the patch or patches of ecchymosis. Weapons commonly employed in India in the production of severe injuries of this class are: (1) a **bamboo staff** or club, often bound with iron (**lathi** or *sonta*), or when bound with iron (*lohabandi*). Harvey[2] mentions that about 32 per cent. of the medico-legal cases reported in Bengal, etc., during the three years ending 1872 were *lathi* wounds; and (2) the rice-pounder, a club usually of hard wood about 3½ feet long, and 1½ to 2 inches in diameter, shod at one end with a thin iron plate about 1½ to 1 inch long. This latter is a common weapon of assault in the Madras Presidency. Instruments more or less frequently used in India in producing slight injuries of this class, requiring special mention are, (1) **shoes**—beating with a shoe is supposed to add insult to the injury; and (2) **ropes** or cords, used either for the purpose of tying up the sufferer as a mode of torture, or to secure the victim during the infliction of other injuries. Usually the arms are secured behind the back by binding together the elbows or wrists. The **split-cane** (*bet*) used in Assam and Burma, for tying bundles, often makes a clean-cut wound. In the mangling form of torture by **bamboo-crushing** (*bansdola*), in which a bamboo on which men are

[1] See injuries to the brain, thorax, abdomen, etc., pp. 119 *et seq.*
[2] *Bengal Med. Leg. Rep.*, 1870–72, p. 20.

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sitting is rolled backwards and forwards over the chest, there may be no external mark of violence or bruising yet the ribs may be broken and the lungs lacerated, as recorded by Chevers.

3. **Punctured wounds.**—Punctured wounds may be caused accidentally by projecting nails, fragments of crockery, etc. If the edges of the puncture are free from laceration or contusion, the indication is that a sharp-pointed weapon has been employed. Sometimes, but not always, the shape of the weapon which has been used is indicated by the shape of the puncture in the skin. Dupuytren found, however, that cylindrical pins produce elongated openings.[1] The obliquity or directness of the thrust, and also the state of tension or relaxation of the skin, may affect the shape of the puncture, and hence two punctures from the same weapon may differ in shape. Very often also, owing to the elasticity of the skin, a punctured wound is of less diameter than the weapon which has been used. Sometimes in a punctured wound, the broken-off point of the weapon employed is found. Punctured wounds are occasionally found in concealed situations, *e.g.* in the rectum or vagina, in the armpit, or under the upper eyelid. A minute puncture in certain situations, *e.g.* over the fontanelles in infants, or in the nape of the neck, may indicate a mortal wound. The existence of several punctured wounds of course very strongly indicates the employment of a weapon, and if all are similar in size and shape the probabilities are in favour of their being due to repeated thrusts with the same weapon.

The weapons in punctured wounds used in India, besides knives and weapons of the bill-hook class already mentioned, are (1) daggers (*katari*), of various shapes—in some of these the handle is transverse to the axis of the blade; (2) the spear (*bhalam, barchi* or *sulfi*); (3) arrows (*tir*); (4) sickle (*haswa*). Arrow wounds, it may be pointed out, are frequently fatal.

In Bengal, etc., in the three years ending 1872, there were fifteen fatal cases out of a total of twenty-five. The case below illustrates the great penetrative power frequently imparted to these projectiles. The pickaxe (*gainti*), hoe-fork (*kanta-kudáli*) may also cause a punctured wound, probably with much contusion; and punctured wounds may be produced by thrusts with a pointed bamboo.

Case.—Arrow wound.—A Hindu female, aged fifty. An arrow, having first passed through the fleshy portion of the right forearm, had penetrated the chest between the eighth and ninth ribs, and was sticking in the body. On opening the chest the arrow was found to have passed through the diaphragm, having slightly cut the upper surface of

[1] *Bengal Med. Leg. Rep.*, 1870–72, p. 416.

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the right lobe of the liver, pierced through the lower lobe of the right lung, and penetrated about an inch into the spine behind the heart and root of the lung. There was a large quantity of fluid and clotted blood to the right of the spine, but the heart was uninjured.—*Ind. Med. Gaz.*, 1875, p. 257, Dr. S. Manook.

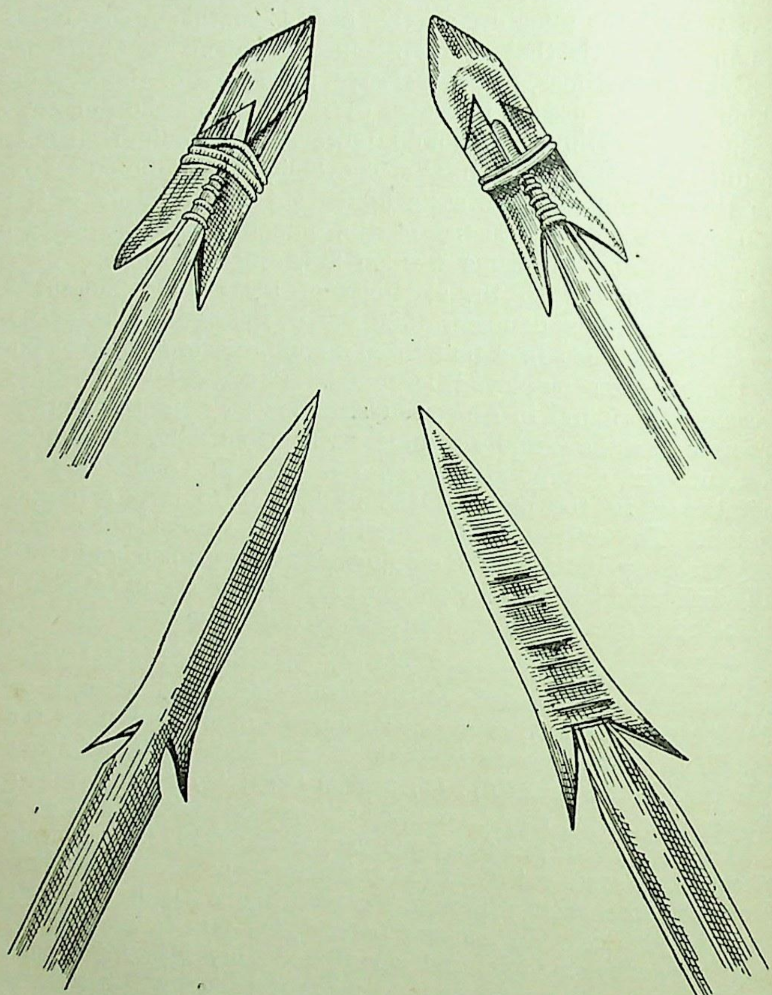


FIG. 11.—Poisoned Arrows of Aka Tribe.
(Half actual size. From a drawing by L. A. Waddell.)

Same weapon may cause wounds of different classes.—A heavy weapon of the bill-hook class may, for example, produce all four varieties. Hence the existence on the body of the same individual of wounds belonging to two or more of these

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four classes, does not necessarily indicate that two or more weapons were employed, or that more than one person was concerned in their infliction.

Injuries by animals may produce wounds of any of the above classes. —Injuries without visible solution of continuity, often severe enough to cause death, are sometimes caused by elephants kicking, trampling on, or butting the injured individual, or by the animal seizing the individual with his trunk and dashing him forcibly on the ground. Apparently incised wounds may be caused by the tusks of the wild boar. Harvey describes such wounds as "long, clean rips," and mentions a case in which a wound so produced, on the inside of the left thigh, was twelve inches long, three deep, and one broad, and, dividing the femoral arteries, caused death by hæmorrhage. Fatal contused and lacerated wounds may be caused by various animals; thus they may result from a bite, or from a blow with the paw, or from injury by the claws, of an animal of the tiger class, in which case the neck is often the seat of injury; or they may be the result of a bite from a crocodile, or of an injury inflicted by a bear, in which last case the scalp is often found greatly torn. Again, contused and lacerated wounds may be the result of injuries inflicted by domestic animals, *e.g.* a kick or bite from a horse or cow. Punctured and lacerated wounds may be caused by the tusks, or more frequently by the horns, of animals. In Bengal, etc., in three years, twenty cases of gores by horned cattle, ten of them fatal, were reported. On the whole, injuries caused by animals are so characteristic in appearance that there is seldom any difficulty in deciding as to their origin.

Case.—**Kicked to death yet no external marks.**—A woman was kicked to death by her husband. Her body was found by neighbours and a doctor called who reported no marks of violence, and death probably due to natural causes. A *post mortem* was made and the sternum found fractured in both places, and two days later a second *post mortem* was made when extensive discoloration of the back noticed and thought at first to be *pus*-staining. The discoloured patches were incised and subcutaneous extravasations found which were traced to multiple fractures of the ribs about their angles. These fractures were not discovered at the first *post mortem* and it is therefore likely if the sternum had not been fractured a crime would not have been suspected.—F. Crookshank, *Trans. Med. Leg. Soc.*, 1909, 19.

4. **Internal injuries without visible wound.**—These may be accompanied by serious internal solutions of continuity, *e.g.* fractures of bones, or rupture of some internal organ (see p. 119, etc.) such as the spleen, and hence may be of any degree of severity, from extremely slight to mortal wounds.

Case.—In 1884, when the insane Rajah of *Kolapur* died suddenly after a struggle and fall from his keeper, it was found that several ribs were broken without any external marks.

Examination of Wound Cases.

The following points should be noted in all Wound Cases **in the Living** as well as in the dead.[1].

[1] Modified from F. J. Smith's *Med. Jur.*, p. 156.

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1. Kind (incised, lacerated, punctured, bruised, etc.)	With reference to kind of weapon (and degree of offence), danger to life.
2. Number	With reference to self-infliction, evidence of struggle, kind of weapon, shock and hæmorrhage, etc.
3. Position on body	With reference to self-infliction, danger to life.
4. Direction and organ wounded ...	With reference to danger to life, how inflicted.
5. Size (length and breadth) ...	With reference to how inflicted, danger to life.
6. Depth	With reference to danger to life and self-infliction.
7. Edges and ends	With reference to kind of weapon.
8. Foreign bodies present	With reference to how inflicted, bits of glass, hair, dirt, etc.
9. Hæmorrhage amount	With reference to danger to life.
10. Inflammatory reactions ...	With reference to time inflicted, *ante-* or *post-mortem*.
11. Cuts and stains on garments ...	With reference to kind of weapon, how inflicted, etc.

In wounds in the Dead, in addition to the above, carefully examine and note down the appearance of the wound without disturbing the latter, and photograph it if possible. Note amount of blood effused and the presence of spirted blood-stains on objects in the neighbourhood where the injury was received. Whether the blood is coagulated, and firmly so; presence of *rigor mortis* and *post mortem* stains. Then the interior of the wound may be examined as to clots; and in stab cases the direction and depth explored gently by a blunt bougie, the deeper course of the wound is to be exposed by dissection without interfering with the external wounds which should be preserved for comparison with the alleged weapon. If a bone is injured, the injured portion should be removed as evidence.

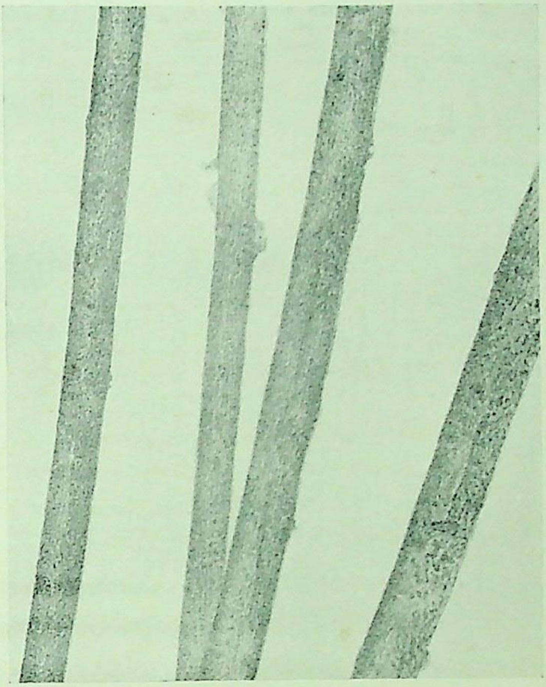
Artificial Bruises in Malingering and for False Evidence.

The appearance of bruises and blisters is sometimes produced by malingerers or for false evidence in India by the application of the common weed Lal Chitra (*Plumbago rosea* or *Zeylanioa*).

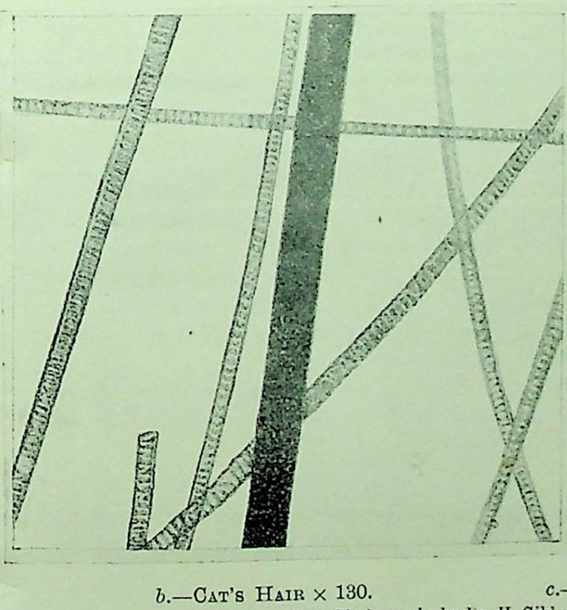
Case.—**Artificial "Bruises" by Lal Chitra.**—In 1912 two undertrial prisoners, accused of murder, while confined in the Jhenidah Sub-jail, brought a charge of torture against two constables and a Sub-Inspector of Sailkura p.-s., one of them complained of having been branded with a pair of hot tongs (*chimta*) and the other of having been assaulted. In support of the charge they showed marks on their persons.

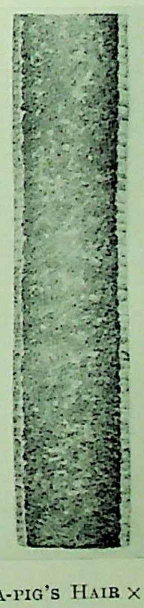
Mr. Quarry, Superintendent of Police of Jessore, inquired into the

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a.—Human Hair × 130.





b.—Cat's Hair × 130. *c.*—Guinea-pig's Hair × 130.

(From Micro-Photographs by Dr. H. Gibbes.)

[*To face p.* 114.

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charge and was satisfied that no assault had been committed. The marks on the body of the prisoners were in Mr. Quarry's opinion caused by the use of certain plants common in the locality—probably with the connivance of the jail warders. In support of this supposition he cited the following instances: In 1911 when he was at Bhagalpur two prisoners, some three days after their admission to the Bhagalpur Jail, brought a charge of assault against the Police, and in support of their complaint showed some injuries. The Jail Doctor and the Civil Surgeon were both of opinion that the marks on the person of the prisoners were caused by beating with a stick some ten days before the examination. The Superintendent of Police in the presence of Mr. Quarry marked thearm of a head-constable with a seed (Latin name *Semecarpus Anacardium*; Bengali name Bhela) commonly used by *Dhobis* for marking clothes. The following morning the Collector, the Superintendent of Police, and the two doctors mentioned above met and the head-constable was examined. Both the doctors expressed a decided opinion that the marks on the head-constable were bruises caused by beating some ten days before the examination.

Mr. Quarry while at Jhenidah heard of a plant which, if touched, would leave a mark like a bruise. He sent for a stem of this plant, and it was brought to him within half an hour, which shows that it is a common plant and is not difficult to find. With the stem he just touched the forearm of a constable and within an hour there was a nasty-looking bruise just as if the man had been struck with a cane. Five days after he took the constable to the Civil Surgeon, who assured Mr. Quarry that the man must have been struck with some instrument like a cane about a week before the examination.—Lal Chitra produces such effects.[1]

Evidence from Foreign Bodies.

Foreign bodies found in the wound: such as broken pieces of glass, splinters of bamboo or other wood may indicate the means by which a wound was caused, also the broken-off point of a knife or dagger, or the projectile or wadding or pellets of gunpowder of a firearm. Deep punctured and gunshot wounds should specially be searched for foreign bodies of this latter description, and, if found, should be preserved for production in court, as they are frequently of great importance as links in a chain of evidence. For example, the broken-off point of a knife found in a wound, may exactly fit a knife alleged to have been used, or this may have a perfect point, showing that it was not the weapon employed. Again, a projectile found in a gunshot wound may fit, or be too large to have been discharged from, the firearm alleged to have been used; or a piece of paper or cloth, used as wadding, and found in a gunshot wound, may correspond to similar fragments found in possession of the accused. Foreign bodies are not always found in gunshot wounds; a projectile, for example, may have completely traversed the body or may have lodged and subsequently dropped out, as sometimes happens when the wound is shallow,

[1] *Bengal Criminal Intellig. Gaz.*, Feb. 11, 1916.

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or when a portion of clothing has been carried into the wound with the projectile.

For detecting foreign bodies in wounds and for the existence and particulars of fractures the Roentgen rays may be used. X-rays photographs are admissible as evidence in medico-legal cases; but the 'skiagram radiograph,' being only a *shadow* picture, is liable to distort the truth unless it is carefully made and its details are interpreted by skilled persons.

Thus rachitic changes may simulate injury of bone, and injury of bone not to be shown in certain planes. It does not show injury to the soft tissues. Radiographs should be taken in two different planes and at definitely marked distances. As evidence, the radiograph should have marked upon it the side of the body and the part photographed and also the part of the body in contact with the plate. It is well to have a radiograph of the corresponding limb or part for 'control' purposes. When a radiograph is produced as evidence the defendant should demand the privilege of employing expert testimony to explain its meaning to the judge and jury.

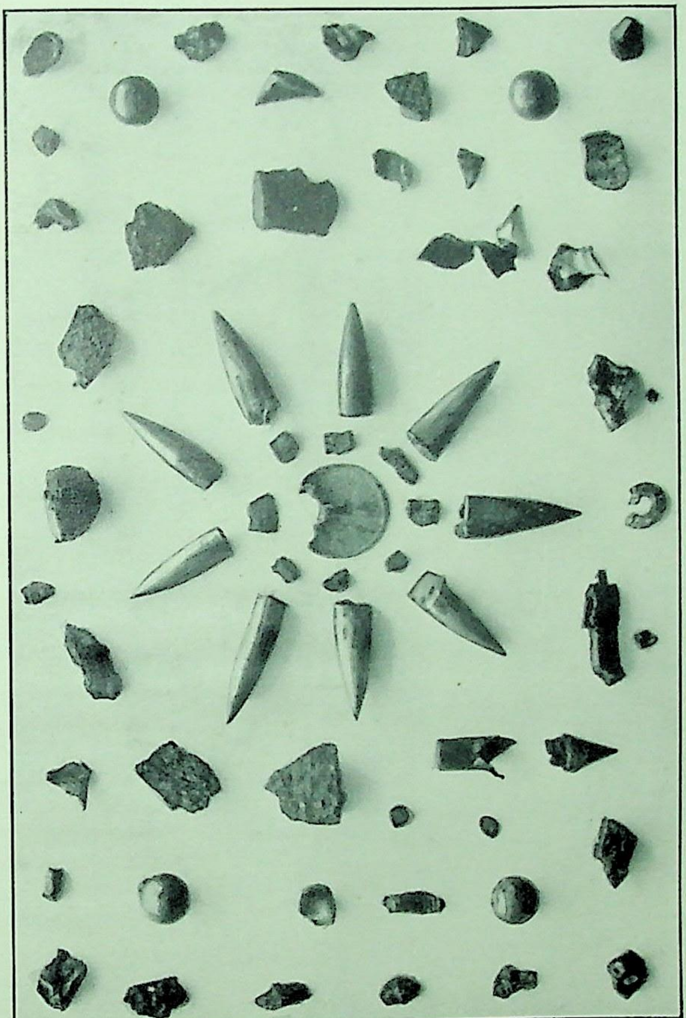
Evidence from Alleged Weapon.

The alleged weapon may affect the question of the guilt or innocence of the accused. Thus the character of the injury may show that it could not have been caused by the weapon produced by the prosecution. The alleged weapon should be compared with the wounds themselves, and with any cuts on the clothes. It should also be examined for stains of blood, adhering fragments of hair, etc. If a firearm, it may show signs of recent discharge. Recently discharged firearms will be found blackened inside the barrel, from the residue left by the gunpowder after ignition. This residue consists mainly of finely divided carbon and potassium sulphide, and yields to water a dark-coloured liquid, alkaline in reaction, and which, after filtration, strikes a black colour with a solution of a lead salt. After a time the potassium sulphide becomes oxidized into potassium sulphate, rust (hydrated ferric oxide) also forming. Hence, owing to the oxidation of the sulphide into a sulphate, washings from a firearm which has been some time discharged, may show no alkaline reaction, and give no blackening with lead salts. The 'fouling' of the modern gunpowders, cordite, etc., is different. Again, the weapon alleged to have been used may show signs of recent fracture, or be bent or otherwise injured as the result of its use.

Wounds in Living. Is Wound dangerous to Life?

This information may be required in cases, especially where the question of bail is being entertained, as bail cannot be

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BULLETS AND FOREIGN BODIES FROM WOUNDS.

(After Major N. Mackworth, I.M.S.)

[*To face p.* 116.

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granted where the probability of a charge for murder or criminal manslaughter arises.

The Danger to Life *primarily* depends mainly on[1] (*a*) the Amount of Hæmorrhage, (*b*) the Organ wounded, and (*c*) Shock; and secondarily on the probability of (*a*) Secondary Hæmorrhage, (*b*) Septicæmia, Erysipelas, Tetanus, and Scarring causing stricture of æsophagus, bowel, etc. There arises here also the question of pre-existing disease as a contributory factor.

On the question whether the wound is likely to leave any serious Personal Disablement, see chapter on "Insurance and Compensation for Accidents," though this information may also be required in criminal cases.

Wounds in Dead. Was Injury inflicted during Life or after Death?

Injuries inflicted after death, although often the result of accident, may also be the result of design, the motive being either concealment of a crime, or fabrication of evidence in support of a false charge. Further, the fact that an injury severe enough to cause death was inflicted during life, is evidence in favour of its having been the cause of death. Hence the importance of this question.

Case.—**Fabricating wounds** and mutilating bodies of the dead.—Decapitation is done by the rest of a gang to prevent identification in cases of wounded or killed thieves as related by Chevers, or the mutilation may be done with a dead body to fabricate a false charge of murder against a particular party. Thus in the *Nizamat Adalat Report* for Bengal, Vol. VI. 1856, p. 834, and 1855, p. 180, a case is reported from Tirhut. The body of a deaf and dumb beggar who had died of disease was found fearfully hacked and cut, leaning against the house of a person against whom the accused had a grudge. Four persons were convicted by the judge, but were acquitted by the higher court. For some other instances of mutilation, see Chevers, *Med. Jur.*, 479 to 500.

Ante mortem injuries are distinguished from *post mortem* injuries by the presence of signs indicative of vital action. These may conveniently be considered under the heads of (1) Ecchymosis; (2) Effusion of blood; (3) Other signs.

1. **Ecchymosis.**—Contusions inflicted during life, if severe, are generally, but not invariably, followed by ecchymosis. Ecchymosis may appear even if the individual has lived only a very short time after receipt of the injury; and further, ecchymosis from blows inflicted during life may not appear until after death has taken place. The presence of ecchymosis,

[1] Modified from Dr. F. J. Smith's *Medical Jurisprudence*, p. 182.

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however, does not necessarily indicate that the injury producing it was inflicted during life. Christison found that blows inflicted on dead bodies, within two or three hours after death, were followed by ecchymosis, not distinguishable from ecchymosis the result of blows inflicted during life. If the individual has lived for some time, say more than twenty-four hours after receiving the injury, changes in colour will probably be found at the circumference of the ecchymosed patch, from purple to black, violet-green to yellow—thus affording a clue to length of time inflicted. Thus the purplish-black becomes by the third day violet, by the fifth day green, and by eighth to tenth day yellow, and the injured part will probably be found swollen. The presence at the circumference of the ecchymosed patch of changes in colour of the above kind and the presence of swelling of the injured part, show that the injury was inflicted some time before death.

2. **Effusion of blood.**—In a dead body the blood remains fluid for some time after death, rarely beginning to coagulate until four hours, and sometimes not until twelve hours, after death. Hence an injury inflicted after death, while the blood is still fluid, may be followed by effusion of blood. Owing, however, to arrest of the heart's action, no arterial spouting occurs, and the quantity of blood effused is much less than would be effused from a similar injury inflicted during life. Further, blood effused from a wound, made more than ten minutes after death, rarely coagulates. Hence, marks of arterial spouting indicate infliction while the heart is beating. Much hæmorrhage also indicates *ante mortem* infliction, and if the blood effused is found coagulated, the presumption is strong that the injury was inflicted either during life, or very shortly after death. *Post mortem* infliction is indicated if the effused blood is found fluid, but not necessarily by the quantity of effused blood being small, seeing that severe contused and lacerated wounds, inflicted during life, are sometimes followed by but little hæmorrhage.

3. **Retraction and eversion** of the edges of wound follow the infliction of an incised wound made during life or shortly after death. Wounds other than incised wounds, inflicted during life, exhibit this character in proportion to the closeness with which they approximate in nature to incised wounds. Hence in incised wounds, or wounds approaching in character to incised wounds, indications of infliction during life, or shortly after death, are:—(*a*) retraction and eversion of the edges of the wound; (*b*) hæmorrhage into the wound, and into the

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cellular tissue around it; and (*c*) the presence of coagula. In throat wounds, Dr. A. Powell has remarked inversion of the edges in the wounds due to the retraction of the platysma muscle in the cut skin.

SUMMARY OF *ANTE* OR *POST MORTEM* INFLICTION.

Signs of inflammation around injury Discoloration at circumference		**Certainly before,** and probably 24 hours before, death
Marks of arterial spouting Extensive hæmorrhage		**Before** death
Coagula	Indicate infliction	**During** life, or very shortly after death
Retraction and eversion of the edges of the wound Ecchymosis		**During** life, or probably not more than three hours after death
Complete absence of all the above characters		Probably more than twelve hours **after** death

Special Wounds according to Regions: Head Wounds.

Scalp.—Contused and lacerated, and even apparently incised wounds penetrating to the skull are especially likely to follow blows from blunt weapons on the scalp. Occasionally from such blows, the inner surface of the scalp is found ruptured without there being any rupture of the outer surface. Wounds of the scalp only are not likely to cause danger to life, except from the supervention of inflammation and erysipelas. Other things being equal, these are more likely to follow contused and lacerated, than clean-cut wounds. Erysipelatous inflammation, although a common sequel of scalp wounds in temperate climates, appears rarely to follow such wounds in India. On the other hand, the scalp may seem uninjured, yet the brain may be injured by fracture of the skull or concussion or hæmorrhage.

Skull.—Separation of the sutures without fracture may occur, even in old persons, from mechanical violence. Harvey records sixteen cases—one an old man of seventy—in which this was the result of *lathi* blows. Fractures of the skull may be simple or compound, direct or indirect. Simple fracture is a usual result of a fall on a flat surface, while fractures from blows with blunt weapons are, unless the head is protected by a thick turban or some similar covering, usually compound. Fractures from blows with blunt weapons are in the great majority of cases direct, *i.e.* at the site of the blow. Indirect fracture, *i.e.*

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fracture by counterstroke, common as a result of falls, is comparatively rare as a result of blows with weapons. In fractures of the skull the danger to life mainly depends on the amount of injury to the brain; and other things being equal, the amount of such injury is likely to be greater, the thinner the bones at the seat of fracture. Hence blows on the temple and punctured wounds of the orbit are specially likely to be attended with danger to life.

Case.—**Pounding of skull.**—At Almora a robbery case is reported by Lt.-Col. L. A. Waddell, in 1901, in which the skull of the victim was smashed in and almost pulpified by beating with a large stone.

Sword-cuts of skull are especially common amongst the excitable Burmese, who use their heavy cleaving *dahs* on slight provocation. In these cuts a shaving of the skull and scalp may be sliced off, or nearly so, by a glancing cut; but the most serious are vertical wounds fracturing one or both tables of the skull and those accompanied by depression of the skull and injury to the brain substance. In the vertical wounds the inner table is frequently fractured, although there may at first be an absence of head symptoms.[1] One of the worst instances of extensive sword-cuts of the skull is the Jhelum case, here cited.

Case.—**Multiple sword-cuts** through skull and other bones.—A tragedy is reported by Lt.-Col. L. A. Waddell from Jhelum in May, 1881, where he saw a *sais* (groom) caught red-handed in the act of killing his wife and her paramour with an Afghan sword, inflicting remarkably extensive cuts through bones, in which the latter were sliced through almost as if they were cheese. The wife endeavouring to save her paramour received a cut which bisected the left side of her chest from the spine to the sternum as if the thorax were sawn through in half, cutting through the ribs, spinal column and vertebræ, across left lung and into the heart. The same cut also severed both bones of the right forearm above the wrist, which had been clasping her paramour, and the hand was left hanging only by about two inches of skin. Death was instantaneous in a pool of blood. Turning to the man, the infuriated *sais* dealt him a cut at his head, which nearly sliced off the whole top of the skull with its contained brain, the cut extended from above the level of the eyebrows transversely through the skull and brain to the other side, leaving only about three inches of the skull uncut to complete the circuit. The same sword-cut also cut into the man's axilla incising several ribs, as the man had ducked his head and was protecting it by his uplifted arm. After the man fell the *sais* nearly severed the remaining portion of the head from the body by two cuts, one of which sliced off the angle of right lower jaw and the other cut through the neck down cervical spine. The sword was one-edged and exhibited after the tragedy a somewhat sinuous edge, through being wrenched out of the cut bone into which it had become embedded. The *sais* was a muscular, middle-aged

[1] C. C. Barry, *Ind. Med. Gaz.*, 1901, 377.

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man, who had no experience in wielding a sword. He made no attempt to deny the crime, but pleaded provocation. He suffered the death penalty.

Brain.—Injury to the brain frequently follows a fracture, especially a depressed fracture, of the skull, and, as stated above, is the main source of danger in such fractures. Injury to the brain may, however, occur without fracture of the skull, and sometimes results from a comparatively slight blow on the head. As in the case of fracture of the skull by counterstroke, the seat of the injury to the brain may be at a point opposite to the spot to which the violence was applied. The brain injury may be a *contusion followed by concussion.* An injury of this kind may prove immediately fatal, or produce temporary insensibility, which may closely resemble intoxication, and be only distinguishable from it by the absence of alcoholic odour in the breath; or may produce only slight immediate effects, but be followed after an interval by inflammation, ending in death. Guy, for example, mentions the case of a woman who received an injury on the head, and after remaining well for twelve days, fell ill and died with symptoms of compression; and also the case of a girl who, after a fall on the head, suffered simply from headache for six weeks, but died two months after the fall from brain affection. The injury may be *compression,* caused by depressed bone, effused blood, or the products of inflammation. The brain is specially likely to be injured by depressed bone, in punctured fractures, and in fractures in situations where the bones are thin.

Effusion of blood on the surface, or into the substance of the brain, may occur with or without fracture of the skull, and may cause immediate insensibility, followed by death in a few minutes, or, when the effusion occurs slowly, insensibility may not set in for an hour or more. The middle meningeal artery is frequently ruptured, as a common occurrence, with or without fracture of the bone, as a result of a fall or blow. Often there is no immediate unconsciousness or only a momentary stunning, after which the patient may walk many miles and transact his business. Later, perhaps some hours later, effusion takes place between the *dura* and the skull, perhaps accelerated by some stimulant or excitement. Coma sets in as a result of compression, and the patient dies unless surgically treated. Coroners' juries frequently censure house surgeons who have failed to recognize such cases and to detain them in hospital. Professor Powell has held autopsis on three such cases in the practice of one house surgeon who had not correctly diagnosed any of them. Effusion of blood from violence *without fracture*

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of the skull, may or may not be accompanied by appearances of contusion of the integuments covering the skull. If accompanied by such appearances, the question may arise whether the effusion was the result of the external violence which gave rise to these appearances, or the result of disease or excitement. A similar question also may arise even in cases where no marks of external violence are apparent, as effusions of blood from violence may occur without any external signs of injury being present. An effusion of blood from violence is generally, unless the brain itself be torn, on the surface, and not in the substance, of the brain. It is commonly located immediately below the seat of violence, but in some cases is found at a point directly opposite thereto. Effusion of blood from *disease or excitement* is sometimes extremely difficult to distinguish from effusion caused by violence. From disease, however, effusion rarely occurs in persons under the age of forty; most commonly takes place in the substance of the brain, and careful examination will generally disclose a diseased condition of the vessels. Effusion from excitement—alcoholic or non-alcoholic—may occur in persons of any age. Signs of congestion of the cerebral vessels co-existing with effusion, are to a certain extent in favour of disease or excitement being its cause. It must further be pointed out that even if the probabilities are in favour of an effusion being due to violence, the question may still arise whether the violence was a blow, or the result of a fall. Questions of this kind not infrequently arise in the case of a fight between intoxicated persons. Blows are interchanged; the individuals perhaps are separated; one of them is then seen to stagger and fall, becomes insensible, and dies. *Post mortem* examination shows the cause of death to be effusion of blood on the surface, or into the substance of the brain. In such a case it is often difficult in the extreme to arrive at a definite conclusion on the question as to whether the effusion of blood was the result of (*a*) a blow received during the fight, or (*b*) excitement or disease, or (*c*) the fall after the termination of the struggle. *Compression* from the products of inflammation may set in and prove fatal several days or weeks after receipt of the injury.

Lacerations of the brain may be caused by a weapon or projectile penetrating the skull, or by fragments of depressed bone; or may occur without injury to the skull, either immediately below, or at a point directly opposite to, the seat of the violence. Wounds of the brain are, of course, attended by great danger to life. Very severe wounds of the brain, accompanied even by loss of substance, may not cause immediate

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death, or even immediate insensibility, and in exceptional cases recovery may take place.

Face.—Wounds of the face are not likely to be dangerous to life unless the orbit is involved or the injury or resulting inflammation extends to the brain. Injuries to the face by causing permanent disfiguration, loss of sight, or teeth, etc., often come within the definition of 'grievous hurt.' Slitting or cutting off the nose is a recognized punishment for unfaithful wives, who after the operation are described as '*Nakti*' or 'nosed.' Often when the victim is a female the lips or breasts are also wounded, but no other injury may be present, indicating either submission of the sufferer to the punishment, or the participation of several persons in the outrage. When the victim is a male the motive is commonly either sexual, or punishment for theft; or, if the teeth have been employed, the injury may have been inflicted in the course of a struggle, and indicate no special motive. Injuries to the nose and ears caused by forcibly pulling out ornaments are not uncommon, especially in females, and may, by causing permanent disfiguration, amount to grievous hurt. In such cases the motive may either be theft, or desire to cause hurt. Injuries to the eyes also are not uncommon, and may be the result of direct violence, *e.g.* gouging out by the fingers, or injury by a sharp-pointed weapon, the motive for infliction of the injury being similar to those leading to wounds of the nose or ears. Or the injury may be the result of indirect violence, and indicate no special motive. As examples of injury to the eyes from indirect violence, it may be mentioned that blows with a club on the head sometimes cause rupture of the eyeball; and wounds of the eyebrows are sometimes followed by amaurosis.

Cases.—**Gouging out the eyes.**—In 1854, a very brutal case was tried at Mangalore, in which the paramour of a married woman, becoming tired of her, or jealous, gouged out her eyes with a curved knife and a needle. The woman recovered.—*Faujdar Adalat*, 1854.

Chevers gives a case of a man who gouged out both the eyes of his wife with his fingers, and otherwise maltreated her, because she declined to have connection with him, being very young.

In Macnaghten's Reports, Vol. II., 427, a case is given of a man who, having tied the hands and feet of his wife, threw her down, sat upon her breast, and put out her eyes with a heated iron. In the case of bodies found exposed in the fields or jungle, it should be remembered that the eyes are generally the parts first attacked by birds of prey.

The loss of a tooth from a blow is a common complaint, but it is usually false and intended to establish a charge of 'grievous hurt.' The knocking out of teeth is rather rare in

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India, as the fist is seldom used for assaults. When blows are delivered over the mouth or eyes it is usually with a shoe. In false cases there will likely be no signs of injury to lips or gums or adjacent teeth, although the alleged weapon is usually a thick *lathi*, or a large stone, the cavity is usually old and contracted, and the teeth of complainants, usually an old man or old woman, are generally loose. The incisor tooth produced in such false charges is usually unbroken, and old and dry.[1]

Spine and Spinal Cord.

Generally the danger is in proportion to the extent of spine injured. Death occurs instantaneously if the medulla and upper part of the cord be wounded. Serious injuries to the cord above the third cervical vertebra are immediately fatal from paralysis of the muscles of respiration. Serious injuries lower down give rise to secondary effects, from which death may follow long after the receipt of the injury. Injury to the spinal cord may occur without fracture or dislocation of the vertebræ. A blow, for example, on the spine, may cause concussion of the cord followed by paralysis, or may set up inflammation followed by softening of the cord.

Concussion of the cord sometimes results from a railway accident, and in actions for damages in cases where this injury is alleged to have been received, the question whether the plaintiff's symptoms resulted from the accident or from disease, or are pure malingering, is sometimes a very difficult one to deal with.

Fracture of the second cervical vertebra with displacement and immediate death, is a not infrequent result of a fall from a height on the vertex. If the bones or ligaments are diseased, very slight violence may cause displacement and fatal injury to the cord, and Taylor mentions a case in which displacement of the odontoid process, and fatal injury to the cord, appear to have been caused simply by the muscular effort of throwing the head forcibly back. Fatal injury to the cord from non-accidental violence may be caused without a weapon. Fatal fracture of diseased vertebræ has resulted in several cases from the well-meaning but ignorant efforts of bonesetters. Fatal fracture—dislocation of the cervical vertebræ—has also resulted from reprehensible horseplay in lifting up children by the head "to show them London." In Urdu "to show them a deer" or "the children of the sun." Fatal injury to the

[1] W. D. Sutherland, *Ind. Med. Gaz.*, 1899, 241.

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cord, unaccompanied by injury to any portion of the body other than the spine, is rare as a result of blows from blunt weapons, but may occur when the neck is the seat of the injury, and may even occur without any external marks of violence being present. In one of Harvey's cases, for example, a woman aged sixty was killed by a blow with a club on the neck. Death resulted from injury to the cord due to displacement of the vertebræ, but no external marks of violence could be seen, although on dissection blood was found effused into the muscles of the nape.

Case.—**Laceration of cord** without external injury.—This is a usual way of causing death in this country, especially in the case of children. The neck is twisted and dislocated, causing laceration of the spinal cord. In 1860 a woman was condemned to death, at Combaconum, for murdering a child in this manner, for the sake of stealing his jewels. There were in this case no external marks of violence.—*Madras Faujdari Adalat*, 1860.

Hacking the spine with a sword, bill-hook, or other heavy cutting weapon—causing sometimes decapitation—is a common mode of murder all over India, and specially so in the Central Provinces, Oudh, and the Panjab.

Neck Wounds.

Injuries of this region from mechanical violence other than the use of edged weapons, are chiefly dangerous to life from their effect on the spinal cord. A case cited by Harvey, however, shows that mechanical violence may cause very extensive, possibly fatal, injury to the soft parts in front of the neck without dividing the skin. Wounds of the neck from edged weapons are often suicidal, and often also homicidal. In cut throat, suicide is more or less contra-indicated, if the wounds are multiple, unless one only is severe; or if the wound is single and of great severity, more than sufficient to destroy life; or if the wound is low down on the neck. Wounds of the neck vary in danger to life according to their situation and depth. From the position of the large blood-vessels lateral wounds are more dangerous to life than wounds in front, and wounds low down on the neck more dangerous than wounds high up. Wounds of the windpipe only are attended with little danger to life. Wounds of the neck dividing the gullet are almost always fatal. Wounds of the large vessels are mortal injuries, death resulting either from hæmorrhage, or from entry of air into the circulation. Wounds of the carotids are not necessarily immediately fatal.

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Case.—**Survival in cut throat.**—Chevers quotes a case in which a man, with the carotid artery divided, survived until the following day. It appeared that a man was aroused in the night by two thieves, who were in the act of stealing in the house. In the struggle which ensued one of them cut him in the neck, and they escaped. After receiving the cut, he said that he had seen the prisoners, whom he named, stealing his *goor*, that he had seized one of them, and that the other cut him on the neck with a *dhao*, or knife, and both made their escape. The accused not having come with the neighbours, were sent for and confronted with the wounded man, who accused them as above. The man's brother stated that the occurrence happened late at night, and that it was then moonlight. The man died the following day. The civil surgeon's evidence was as follows: "I found an irregular deep wound on the neck, apparently caused by the sharp, pointed instrument; the wound, in my opinion, was not caused by the man's own hand; the carotid artery was divided, and deceased had bled to death." It is to be regretted in this case that it is not recorded whether it was the *external* or the common carotid artery that was divided. If it was the latter, Chevers says that this is the only recorded case of so long a survival; but Taylor (ed. of 1883, Vol. I., p. 631) says: "There are several cases on record which show that wounds involving the common carotid artery and its branches, as well as the internal jugular vein, do not prevent a person from exercising voluntary power, and even running a certain distance."

Case.—Prof. Powell reports: "Ten years ago when driving to the Morgue, I observed a scuffle going on about sixty yards in front of me. A constable came running in my direction holding a handkerchief to his neck. I called out to him to attend to his business instead of running away from it, and took his number to report him. About an hour later his dead body was brought to the Morgue. He had been stabbed in the neck, and had run a distance of 80 yards before he fell. I found the right common carotid severed in two-thirds of its diameter."

Thorax Wounds.

Penetrating wounds of the chest perforating the heart or one of the large vessels, are mortal, but not necessarily immediately mortal, wounds. In such wounds the rapidity with which death occurs greatly depends on the rapidity with which hæmorrhage takes place.

Wounds of the heart may be penetrating or non-penetrating according as they injure the wall or penetrate the cavity. Ninety per cent. are penetrating. The chief dangers of the former are shock and injury to the coronary artery. A needle puncture rarely causes hæmorrhage from the ventricle, but from the auricle it does. Pericarditis, endocarditis, and empyæma are secondary complications. Loss of blood may occur comparatively slowly if a large vessel is only punctured, and the puncture is small; or if the heart is wounded, if the wound is small, or oblique in direction. After a wound of the heart an individual may even survive several days. Taylor

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mentions two cases, one of survival for eleven days with a bullet one-third of an inch in diameter lodged in the septum between the ventricles; and another of survival for five weeks with a mass of wood lodged in the substance of the heart. Recovery may occur.

Taylor mentions that out of twenty-nine instances of penetrating wounds of the heart, only two proved fatal within forty-eight hours. In the others death took place from four to twenty-eight days.—See cases of recovery cited by Powell, *Ind. Med. Gaz.*, 1902.

Case.—**Wound of heart.**—A case narrated by Mr. William White of Rangoon.—"A soldier was wounded in the storming of the Great Pagoda on 14th April, 1852. The ball entered a little above the anterior fold of the left axilla, taking an oblique direction to the cavity of the chest. At first he appeared to be doing well, and the wound closed. Subsequently his health declined, with feverish symptoms and evidence of pulmonary disease. A few days before his death it was noticed that the action of the heart was weak but natural, its systole, or contraction, and diastole, or relaxation, regular and equal. He died worn out and emaciated on the 24th June. On examination, the bullet was found in the left ventricle of the heart, in its most interior part."—Chevers, *Med. Jur.*

Even when death occurs rapidly considerable power of locomotion may remain after receipt of a wound of the heart, as in the case already mentioned, where a man ran eighty yards after a stab penetrating the right ventricle. Taylor also mentions a case in which it is probable that a man ran over eighteen feet after a gunshot wound "shattering to atoms" the auricles and part of the aorta. If the lungs are wounded, death may occur rapidly from hæmorrhage, or after a time from inflammation, but wounds of the lungs are not necessarily mortal. A wound completely transfixing the chest, other things being equal, is not more dangerous than a simple penetrating wound.

Non-penetrating wounds and injuries of the thorax are dangerous to life in proportion to the amount of internal injury. Serious internal injuries of this class are usually, but not invariably, accompanied by fractures of the ribs, but fractures of the ribs may be present without other internal injury. If a rib has been fractured by direct violence, *e.g.* a blow from a blunt weapon, it is usually found broken in one place only, and the ends are driven inwards. When the fracture has been the result of indirect violence, the broken ends are usually driven outwards, and the fracture, if single, is generally at the point of greatest convexity. Ribs when fractured by indirect violence are often broken in two places, one in front and the other behind. Very often also when the violence is of the

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nature of a force compressing the thorax, the fractures are symmetrical or nearly so, *i.e.* fracture of a rib on one side of the body is accompanied by fracture of the corresponding rib on the other side.

Compression of the thorax, causing symmetrical indirect fractures of the ribs, may be due to accidental violence, *e.g.* 'buffer-crushing' on railways, the fall of a heavy weight on the front of the chest, or more rarely to a fall from a height. More frequently it is the result of homicidal violence, and may be due to pressure with the knees, tramping underfoot, or to compression of the body between two bamboos, a process known as '*bans-dola*.' Again, it may be due to kneading with the knees and elbows, or '*kīl kanī*' (see also injuries to the liver). Dr. Harvey mentions a case in which symmetrical rib fractures were present, but no external marks of injury were to be seen on the chest, and suggests that in the case in question the compressing force was probably pressure with the knees.

Non-penetrating injuries of the thorax may injure the lungs or heart in falls from a height, compression of chest by falls of heavy weights, wheels, buffers, or by blows. If the lungs are injured, hæmothorax or inflammation, either of them ending fatally, may follow, even when there is no fracture of the ribs. Emphysema may be present, but this is only dangerous to life from mechanical impediment to respiration. The phrenic nerve was ruptured with instant death in nine cases reported by Dr. Coull Mackenzie (*Ind. Med. Gaz.*, 1889, p. 204).

Rupture of the heart is a comparatively rare result of non-penetrating chest injuries. Dr. Harvey mentions fourteen cases in the three years 1870–72, five of them homicidal, and in several the heart was healthy, but in most there was fracture of rib or sternum and external signs of violence. Dr. Coull Mackenzie describes five cases [1] of rupture of heart alone, one with rupture of spleen and one with rupture of other organs. The five former were caused by heavy weights falling and the other two by running over by laden carts. In four no external injury was visible, and in two no fractures of bones were present. Dr. Gibbons reports one case [2] caused by blow of a thin stick with death in three hours and without fracture of bones. Rupture of the heart may occur independently of external violence, or, if the heart is diseased, from a comparatively slight amount of violence. Again, external violence may cause rupture of an even healthy heart, and yet no

[1] *Ind. Med. Gaz.*, 1889. [2] *Ind. Med. Gaz.*, 1897, p. 443.

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external marks of injury be present. Hence, when the heart is found ruptured and no marks, or slight marks only, of external violence are present, it may be difficult to say what was the cause of the rupture. Non-penetrating chest injuries may cause rupture of a large thoracic blood-vessel, *e.g.* of the pulmonary artery, pulmonary veins, or superior vena cava. Rupture of the diaphragm also may occur (see below).

Abdomen Wounds.

Penetrating wounds unaccompanied by any internal injury are, even if accompanied by protrusion of viscera, not necessarily fatal. Death when occurring rapidly is usually from shock, or after an interval from peritonitis. Moreover, such wounds, and also wounds or rupture of the diaphragm, are liable to be followed by hernia, and may hence (from strangulation) cause death indirectly, after a long interval. With a penetrating wound of the abdomen, there may be a wound of a vascular organ or large vessel leading to death from hæmorrhage; or a hollow viscus may be wounded and extravasation of its contents be followed by fatal peritonitis.

Fatal non-penetrating injuries of the abdomen may leave no external marks of violence. In some, but not all such cases, the tissues immediately underlying the skin at the seat of injury may on dissection be found to show signs of bruising and to contain extravasated blood. Blood, however, it must be recollected, may in rare cases be found extravasated in the muscles of the abdominal wall, without violence having been applied. Taylor[1] mentions two such cases; in both the extravasation was inside the muscles around the navel. A non-penetrating injury unaccompanied by any wound of the contents of the abdominal cavity may cause immediate death from shock. This is specially liable to occur from a blow over the region of the solar plexus, and in such a case, after death, no marks of violence, external or internal, may be discoverable.

Case.—**Death from a blow on the abdomen.**—Chevers quotes a case in which a man who was said to have been struck with a thick pole on the right loin died immediately. No trace of injury or of grave disease could be discovered on the most careful examination. "I therefore reported that, as blows inflicted upon the front of the abdomen had been known, in several instances, to cause death by a shock to the nervous system, it was probable that in this case like force applied to the side of the belly had acted in a similar manner."

[1] *Med. Jur.*, I. p. 667.

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Or an injury of this class may cause death from peritonitis, in which case after death, no lesion other than signs of inflammation of the peritoneum may be found. More frequently the cause of death in fatal non-penetrating abdominal injuries is rupture of a viscus such as the spleen or liver. Rupture of a viscus, however, it must be recollected, may occur from *post mortem* violence, especially when decomposition is far advanced. An idea of the relative frequency of occurrence in India of rupture from violence of the different abdominal viscera may be gathered from the following figures. Among the fatal medico-legal cases reported in Bengal, etc., during the three years ending 1872, rupture of the spleen occurred in 564, liver in 129, bowels in 25, kidney in 24, urinary bladder in 8, and of the stomach in four or five cases.

Spleen.—Rupture of the spleen is of somewhat frequent occurrence in India,[1] especially in the more fever-saturated districts where the spleen is often much enlarged by disease,[2] and thus rendered liable to rupture from very slight violence. Indeed, the enlarged spleen sometimes undergoes **spontaneous rupture** with fatal results without the application of any external violence. The normal spleen of Indians as found by Prof. Powell in 2000 autopsies on Indians (omitting cases of malaria, plague, pneumonia and hæmorrhage) weighed a few grains under four ounces.

Cases.—(*a*) **Spontaneous rupture** of enlarged spleen.—Ali Bux, a fine-looking old Mohammedan, aged about 50 years, was engaged in a lawsuit in the Umballa court. In cross-questioning one of the witnesses, suddenly fell down and expired. The friends, who brought the body to the Civil Hospital, were emphatic that he had not received any blow or knock of

[1] Lt.-Col. D. G. Crawford's analysis of 304 cases of ruptured spleen showed that it occurred in 3·08 per cent. of the fatal cases sent by the police for medico-legal examination.—*Ind. Med. Gaz.*, 1902, p. 212.

[2] McLeod, quoted by Chevers, *Med. Jur.* (p. 462), points out that rupture of the spleen is liable to occur in cases of (1) simple engorged spleen; (2) hypertrophied engorged spleen; (3) small hard spleen; (4) large hard spleen. The normal form and size of spleen, according to Gray, are as follows: The spleen has two surfaces, one external and convex, the other internal and concave; two ends, the upper thick and rounded, the lower thin and pointed; and two margins, anterior and posterior, the former often being notched. Gray gives the normal size and weight of the adult (European) spleen as follows: length, about 5 inches; breadth, 3–4 inches; thickness, 1–1½ inch; weight about 7 oz. In natives of this country, whose size and weight is usually much less than those of Europeans, the weight and dimensions of the spleen should presumably be somewhat less than the above. But in many parts of Bengal normal spleens are less common than are enlarged, and the average size and weight of the spleens in the adult native of Bengal would probably be greater than those quoted above. The pathological cause of the enlargement is infection with either malaria or the 'Leishman-Donovan parasite.'

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any kind, and an inspection of the court where he became faint, convinced me that there was no furniture or projecting angles where he could accidentally have knocked against something to cause internal injuries. Autopsy.—On opening the abdomen on 11th October, I found the peritoneal cavity full of a blood-stained fluid. There were also fresh blood-clots. The amount of the fluid could not be measured, but probably there were several pints. The spleen weighed 3 lbs. 13 ozs., and measured 9½ inches by 6½, and was 3½ inches thick. On its inner surface, anterior to and parallel with the hilus, was a rent in the capsule, 6 inches in length. The opening was plugged with fresh black blood-clot. The substance of the spleen was soft and friable. There were no other injuries or signs of disease.—C. H. James, *Ind. Med. Gaz.*, 1902, p. 222.

(*b*) On 5th March, 1878, a beggar woman, Kamini, 30 years of age, who had been suffering from enlargement of the spleen for several years, at 3.30 o'clock in the morning complained of severe pain in her abdomen in the region of the spleen. No remedies were applied or given to her internally, and very shortly after she expired. At the autopsy on the same forenoon: The body was much emaciated, the abdomen

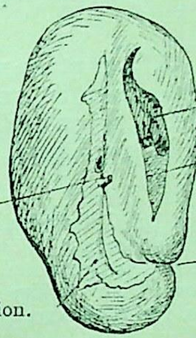


FIG. 12.—Showing Rent in the Spleen Capsule half-filled up with Blood-clot.

was somewhat enlarged, but there were no external marks of violence on it. The abdominal walls were not bruised. The liver was large, fatty and anæmic. The kidneys were fatty and anæmic. The other organs except spleen were healthy. The spleen was 12 inches long, 7 inches broad, and weighed 3 lbs. 14 ozs. Its substance was very hard, and there were two ruptures, each an inch long on the inner surface and lower end. There were several pints of serum in the abdominal cavity. There was 40 ozs. of dark blood of the colour and consistence of black currant jelly in and around the spleen. No bones were fractured.

(*c*) A native male of about 25, suffering from malarious fever and enlargement of spleen, on the evening of the 29th December, 1878, applied for medical relief at the dispensary of the Mayo Hospital. After receiving medicine he walked away slowly, with the assistance of a thick stick, along the bank of the river Hooghly for a distance of about half a mile to a landing-place; on reaching this spot he sat down, and shortly after had several convulsions, vomited a good deal, and died in about half an hour. I examined the body about 12 hours after death when I found it to be well nourished and to have no external marks of violence on it. The lungs were healthy, and there were extensive recent

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pleuritic adhesions of the outer surface of the left lung to the inner surface of the thorax. The spleen was about 12 inches long, 8 inches broad at its lower and 3 inches at its upper end. It was hard. There were two ruptures on its inner surface and through its hilus, each 2 inches long. All the other internal organs were healthy and were anæmic. There was a large quantity of dark fluid blood extravasated into the abdominal cavity. I gave it as my opinion that the deceased died from spontaneous rupture of spleen.—Mackenzie, *Ind. Med. Gaz.*, 1889, p. 322.—Two further cases are published in the *Ind. Med. Gaz.*, 1904.

This liability of the enlarged spleen to be so easily ruptured is taken into account judicially in awarding punishment to cases where a blow, kick, etc., has caused death in this way. For so slight often is the force required to rupture a diseased spleen, that in many cases where this occurs from violence inflicted by another, there is no intention of causing death. In a few cases (8 out of 262) the ruptured spleen was not enlarged.

Cause of Rupture.—The rupture may be caused by accidental violence, *e.g.* a fall, or from the sufferer having been run over by a wheeled vehicle. In non-accidental cases it is often the result of a blow or a kick or a push against a wall or other hard body, without a weapon.

In 102 of the 247 cases of Dr. Crawford the cause was beating with a *lathi* or other heavy blunt instrument. Blows with fist, kicks or slaps or two or more of these combined accounted for 62, or over one-fifth. Falls from trees and in one case from a bridge gave 22 cases, 17 were run over by carts, and 23 were said to have been murdered.

A trivial blow may cause fatal rupture.

Case.—**Rupture of spleen by slight blow.**—Nabu Sheikh, Musalman male, 40, of Diwanganj, 14th November, 1886, said to have been killed by a stab. A small wound, ¾ inch long, gaping ½ inch wide over eighth left rib, about five inches above and external to the umbilicus. From its outer end a slight scratch runs upwards and outwards for three inches. This wound was quite superficial, ⅛ inch deep, penetrating only into and not through the subcutaneous cellular tissue. Peritoneum healthy, contained about half a pint of dark fluid blood round spleen. Stomach healthy, empty. Liver enlarged and congested. Spleen enlarged, about twice normal size; a rupture three inches long, crossing outer side halfway between upper and lower ends. Death was due to rupture of the spleen, probably caused by the blow, trifling in itself, which inflicted the wound over eighth rib.—Dr. D. G. Crawford, *Ind. Med. Gaz.*, 1902, p. 215.

Case.—**Rupture of Spleen by Artificial Respiration.**—Professor Powell reports an autopsy in a case where the spleen was ruptured by a medical man in performing artificial respiration for opium-poisoning.

It may occur without any external marks of violence being present—this was so in about one-third of Harvey's cases—but

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in about one-fifth of these the tissues under the skin over the region of the spleen, on dissection, showed signs of bruising. Rupture, even of an apparently healthy spleen, may be unaccompanied by external marks of violence, but in such cases the subcutaneous tissues will probably (but not certainly) show signs of bruising.

Site of the rupture—this is generally on the inner surface.

Period of survival after rupture.—Death may occur in a few minutes or not for several days. Chevers mentions one case of survival for five days and another of death on the eighteenth day from pleurisy and pericarditis. Considerable power of locomotion may remain after receipt of the injury. Dr. E. G. Russell, I.M.S., gives two[1] cases in which recovery apparently took place after rupture or bruise of the spleen; the diagnosis, in one case, being confirmed by dissection of the victim, who died several years afterwards. He also quotes four cases in which the victim survived the injury for over twenty-four hours; in one case five, in two four, and in one two and a half days. Dr. Powell relates a case of a European lady, aged 60, who was knocked down by a cart, drove to hospital in a springless cart and lived eight days. Her spleen was found ruptured at the *post mortem*.

Cases.—(*a*) Dakka, Hindu male, 31, said to have been beaten on 2nd January, 1888, and to have died "a few days later." *Post mortem* on 7th January, 1888. Peritoneum contained a pint of fluid effused blood; large omentum bruised, small gut bruised in many places; stomach empty; spleen much enlarged, ruptured at upper part of external surface.

(*b*) Mymensingh, Musalman male, ten, said to have died three days after being knocked down. No external marks or injury. Peritoneum healthy; stomach healthy, contained a little muddy fluid; spleen slightly enlarged, a small rupture ¾ inch long at lower end of anterior border, ʒ ii–ʒ iii of blood effused around the rupture.

(*c*) 24-Parganas, Musalman male, fifteen, said to have been beaten with *lathis* on 20th July, 1897, was admitted to the Campbell Hospital on the same day, and died there on the 6th of August; *post mortem* on 7th August. There was an oblique longitudinal mark, five inches long, across the left side of the back, with fracture of four ribs, the eighth to eleventh left ribs. The left temporal and parietal bones, and the left wing of the sphenoid bone, were fractured, liver pale, waxy, bloodless; spleen much enlarged, weight 1 lb., a rupture, ¾ inch long, on inner aspect; left kidney weighed 6 ozs., a rupture in it, ¼ inch long. There can be no doubt about the facts of this case, as the boy was in hospital from the day of the injury till his death. He had undergone fracture of three of the bones of the skull, four ribs, and rupture of two viscera. Yet he survived for no less than seventeen days; and, in the end, the immediate cause of his death appears to have been inflammation of the meninges of the brain.—*I. M. G.*, 1902, p. 219.

[1] *Malaria, its causes and effect*, 1880, pp. 217–221.

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Wounds of the spleen are rarer than rupture.—In Dr. Crawford's series there was only one case to every fifty of rupture. Death has in several cases resulted through hæmorrhage from exploration of the spleen with a hypodermic needle in cases suspected to be malaria or Kala Azar.

(*a*) Dakka, 2nd January, 1872; Musalman male, age not noted, said to have been killed with a needle. Marks of puncture in left hypochondrium. Abdominal cavity contained a great quantity of fluid blood, and a clot weighing 1 lb. 15 oz. Spleen weighed 3 lb. 15 oz., and on its outer surface were punctures corresponding with those in abdominal wall, made by a sharp instrument. The examination was made by Dr. J. N. B. Wise, an authority on native customs, who made the following remarks :—" Death due to hæmorrhage from puncture of spleen. It is customary for *kabirajes*, under certain circumstances, to plunge iron needles into the spleen, when enlarged. This case was an unfortunate selection, as the organ was soft and vascular."

(*b*) Dakka, 14th November, 1880; Hindu female, 45, said to have died of wounds. A wound between scapulæ, six inches long, one broad, one deep. A second wound between tenth and eleventh ribs on left side, six inches long, 1½ broad, penetrating abdominal cavity. Peritoneum contained 4 or 5 coagula; stomach protruded through wound, contained half-digested rice and *dāl*. Spleen escaped through wound, completely divided in two parts transversely.

Liver.—Rupture of the liver is usually the result of extreme violence accidentally applied, such as buffer accidents, or when body is run over by a motor car. There is reason to suppose that in very exceptional cases recovery may take place after a slight rupture of this viscus, and also that in very exceptional cases rupture of the liver may occur during life, without application of external violence. Non-accidental rupture of the liver may be caused without a weapon. Harvey, for example, mentions a case where it was ruptured by a kick, and two others in which the rupture was caused by kneading with the knees and elbows, or '*kīl kanī*.'

Rupture of the liver may occur from violence inflicted during life, without any external marks of injury being left. In about one-fifth of the Bengal cases no external marks of injury were present. Considerable power of locomotion may remain after receipt of the injury. Taylor remarks, that unless the large veins at the back of the liver are injured, bleeding from a ruptured liver may occur only slowly, and the patient survive some time; but thereafter die rapidly from sudden copious effusion of blood, caused by muscular exertion, or fresh violence. The same author mentions one case of survival for eight days, and two of survival for ten days, after rupture of the liver.

In 33 cases Dr. Coull Mackenzie found the *cause* to be :—14 cases by being knocked down by runaway horses in or outside carriages and by

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bullock carts; 8 resulted from falls into the holds of ships and boats; 2 resulted from falls on piles of bricks; 1 was a man knocked down while helping to remove a boiler—the boiler rolled on his back and crushed him to death; 1 was that of a man struck by a tub full of salt, which was being removed from a ship's hold; 1 a porter, who, while carrying a heavy box on his head, slipped and fell on his back with the box on the front of his chest and abdomen; 1 was a man, who, while working on board a ship, was struck by a sling containing three 2-maund bags of *dal*; 1, a drunken man, fell heavily on a hard metal rod; 1, a sais kicked over the abdomen by a horse he was grooming; 1, a lad in a fishing boat which collided with a pontoon of the Hughli Bridge, was precipitated into the river, and either was driven by the current against the pontoon, or its mooring chains a few yards below; 1 was a man struck by the handle of a winch in motion.

Death was reported to have occurred instantaneously in 11, or 32·3 per cent., within an hour; in 4, or 11·7 per cent., in from one to two hours; in 1, or 2·9 per cent., from two to three hours; in 4, or 11·7 per cent., in three to seven hours; in 1, or 2·9 per cent., in three days; and in 7, or 20·5 per cent., the time was not mentioned by the police authorities.

Case.—**Motor-car Rupture of Liver.**—Prof. Powell reports: "A Pardesi, aged 22, ran against a motor-car on the 26th July, 1915, the front axle passing over his abdomen. He died eight days later when I found rupture of the liver.

"In 1902 a clerk was seen to walk about twenty yards and then lie down on a bench in Colaba Railway Station. He shortly after died. *Post mortem* I found the liver crushed into several pieces; one piece nearly as large as a tennis ball lying free in the abdominal cavity. No doubt he was caught between the buffers of some trucks that were being shunted at the time.

"I did not credit the statements of several eye-witnesses who said he had walked unaided to the bench, but subsequent experience of many cases of rupture of the liver in motor-car and other accidents has now convinced me that the statements of the eye-witnesses were quite credible."

Case.—**Homicidal rupture of liver.**—In 1880 a drunken native in an altercation pushed another, Suk Chand Karmokar, who fell heavily to the ground and died "very shortly after." *Post mortem* examination showed no marks of injury on abdomen or thorax, but a rent in right lobe of liver five inches long. Liver was hard and not enlarged. Prisoner was tried for culpable homicide not amounting to murder.—Dr. Coull Mackenzie, *Ind. Med. Gaz.*, 1889, p. 229.

The gall bladder may be ruptured by violence, as in a case mentioned by Harvey, in which the subject was a boy *æt.* five, who had been strangled, and in which the rupture was probably caused by pressure with the knees. Ogston, however, remarks that "ruptures of the gall bladder proper have usually been the result of emetics given to ensure the expulsion of gall stones."

Intestines.—Rupture of the intestines is usually fatal, the cause of death being commonly peritonitis, the result of extravasation of their contents. Rupture may occur solely from

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disease, or from violence acting on a diseased portion of the intestine, or solely from violence. Hence, when this injury is found, careful examination of the ruptured portion for signs of disease, *e.g.* ulceration or softening, is of special importance.

The position of the rupture was the upper jejunum in four cases, the lower in two, the middle in one, the ileum and the sigmoid flexure in one, in Dr. Mackenzie's cases.

Rupture even of a healthy portion of the intestines may occur from a comparatively slight amount of violence. The violence causing the rupture may leave no external marks. Out of twenty-five Bengal cases, in twelve external marks were absent; but in five of these, on dissection, signs of bruising were found in the subcutaneous tissues. Rupture of the intestines may be the result of accidental or non-accidental violence, seven of Harvey's cases apparently were accidental. Ten out of Mackenzie's eleven were accidental, due to horse-kicks, blows, or crushing. When non-accidental, the injury is often the result of a blow without a weapon. Usually, after the receipt of the injury, the sufferer is capable of considerable muscular exertion. For injuries to the Rectum, see p. 139.

In Dr. Mackenzie's fatal cases, 1 died in 7 hours, 1 in 12 hours, 2 in 24, 1 in 29, 2 in 30, 1 in 58 hours, 1 in 3 days, and 1 each in 5 and 8 days. The cause of death was peritonitis in 9 out of the 11 cases, and shock in the 2 others.

Case.—**Rupture of intestine.**—In 1883, Newal Kissori Chaube, in a dispute with a Chinese shoemaker Aghain in Calcutta about the price of shoes, in which the Chinaman struck Newal with a bamboo, and another Chinaman kicked him in the abdomen. The injured man refused to stay in a hospital and went to his house, where he died about five days after the assault. The *post mortem* examination showed the organs generally to be healthy, but there was a circular rupture of the size of a threepenny piece in the lower third of the jejunum, around which lymph was extravasated. The abdomen contained 72 ounces of fæcal-smelling brown fluid, and there was acute peritonitis. Death was reported due to peritonitis following rupture of intestine. The two Chinamen were tried on two counts—culpable homicide not amounting to murder, and doing a rash and negligent act, but were acquitted by the jury on both charges.—Dr. C. Mackenzie, *Ind. Med. Gaz.*, 1890, p. 70.

Case.—**Gunshot blow** of intestine without wound.—Dr. A. Powell reports a case of an officer struck at Sanna's Post in 1900, on the anterior abdominal wall by what he thought was a Mauser bullet. There was only slight bruising and abrasion of skin. A few days later obstruction set in. Abdomen opened showed several inches of the gut gangrenous.

Stomach.—This viscus is liable to rupture from disease. Cases also are recorded of rupture from over-distention and violent ineffectual efforts to vomit, and of spontaneous rupture without any very apparent cause. Taylor mentions a case in which rupture both of the stomach and the

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spleen occurred from a fall of about twenty feet, and in which no bruises or other external signs of injury were present. In one of Harvey's cases, also, although there was a fracture of the skull, and bruises on various parts of the body, the result of *lathi* blows, no external sign of injury could be found over the region of the stomach, although this viscus was ruptured. It is possible, therefore, that rupture of the stomach from accidental or non-accidental violence may occur, and no external signs of injury be present.

Pancreas.—Injury to this viscus from external violence is very rare. McLeod and Harvey, however, each mentions a case; in the first the viscus was ruptured, but no external marks of injury were present; in the second the viscus was "injured," and contusions, not visible externally, were present on both sides of the spine. In both, the injury appears to have been caused by kicks or trampling with the feet.

Kidneys.—Rupture of the kidney solely from disease is extremely rare. Disease or abnormal formation of this viscus may, however, conduce to rupture from violence. Rupture of the kidney usually occurs only from great violence, and hence is often accompanied by other lesions. Notwithstanding this, in nearly one-half of the cases, signs of external violence over the region of the kidneys were absent. In sixteen of Harvey's cases, the nature of the violence causing the rupture was stated. This was in eight, blows from blunt weapons; in two, kicks; in one, trampling; and five resulted from falls from a height. Two accidental cases are reported by Dr. Mackenzie (*Ind. Med. Gaz.*, 1890, p. 205). One, a man, lived 38 hours and died of shock; the other, a girl, died within half an hour, of hæmorrhage. Taylor mentions a case in which a man walked some distance after an accident whereby one kidney was torn completely across, death occurring suddenly, within six hours after receipt of the injury.

Bladder.—In rare cases, rupture of the bladder occurs solely from disease, either of the bladder itself or disease, *e.g.* paralysis or stricture, leading to over-distention. In the great majority of cases, however, the cause of the rupture is violence applied directly to the region of the distended organ. Often in cases of rupture from violence, no external marks of injury are to be found. The injury is usually fatal, either from shock, or peritonitis due to extravasation of urine; recovery, however, sometimes takes place. The violence leading to the rupture may be accidental, *e.g.* a fall from a height, or a fall on some projecting object, or a crush, or non-accidental, *e.g.* a kick in the pubic region. In females, rupture of the bladder sometimes occurs from pressure of the child's head on the urethra, causing over-distention during delivery.

Uterus.—Rupture of the unimpregnated uterus is only likely to occur from very great violence. Rupture of the pregnant uterus may occur independently of violence, as an accident during delivery, and, in rare cases, may be partial only, affecting the peritoneal coat and muscular tissue, but not extending into the cavity. Rupture of the pregnant uterus may occur from external violence without any external marks of injury being present. The uterus often apparently escapes injury, even when great violence is applied to the abdominal wall in attempts to cause miscarriage (see cases 'Abortion'). Harvey, however, mentions a case in which extensive bruising—not rupture—of the uterus, caused in this way, resulted in death; in this case also, no external marks of violence were present. The uterus may be wounded per vaginam, in an attempt to cause miscarriage. Injury to the uterus per vaginam also sometimes

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results from thrusting sticks, etc., into the vagina after rape, or in revenge for infidelity. Rupture of an ovary, or fallopian tube, may be found: this, it must be remembered, may occur as a result of ovarian or tubal pregnancy, and hence blood-clots, etc., found in the abdominal cavity should in such cases be carefully searched for an embryo.

Large abdominal blood-vessels.—Harvey mentions three cases of rupture of the inferior vena cava from extreme violence. In one—caused by the sufferer being jammed between two boats—bruising of the mesentery was the only other serious injury present. In another—the result of a fall from a high tree—the skull was also fractured; and in the third, the liver was ruptured. The same author also mentions a case of probable rupture of the splenic vein.

External genitals.—(*a*) *The male genitals.*—Severe contusions may cause death, or severe compression of the testicles may prove fatal from shock.

Seizing by the testicles is a common method of assault in India, and Chevers mentions a case in which a man dragged another along in this way with such violence "that the whole preputial integument was torn away." Incised wounds may be attended with severe and even fatal hæmorrhage, or by extravasation of urine, ultimately terminating fatally. Incised wounds, amputation of the penis, even removing the whole of the external genitals, are sometimes self-inflicted; generally, however, in such cases the individual is insane, but individuals apparently perfectly sane may mutilate themselves by cutting off a portion of the penis. In India, removal of the male genital organs used formerly to be largely practised, in order to manufacture eunuchs for immoral purposes. Young boys were generally selected, and a clean sweep made of the whole of the organs. Chevers, on the authority of Dr. Elden, appears to consider that, in 1870, this practice still existed extensively in the Rajputana States, and Harvey (1871-72) mentions the case of "a Chamar boy, aged eight, at Banisal, whose genitals were completely cut away, probably to fit him for the duties of a eunuch." Cases of this kind excluded, incised wounds of the male genitals inflicted by another, indicate, as a rule, a sexual motive. Occasionally the person inflicting the injury is a female, as in a case cited by Harvey, of a woman at Kachar, who "seized a weapon and inflicted a deep and severe wound on the penis of her father-in-law, who wished to take liberties with her." He also mentions an exceptional case, in which a eunuch possessed of a penis had it shaved off by some of his fellow-eunuchs, apparently from motives of jealousy.

Case.—A 'playful' **kick** on a boy's perineum is reported by Dr. A. Powell to have caused death by rupture of urethra with extravasation of urine.

Case.—**Branding of Vulva.**—Prof. Powell reports having seen three cases of branding of vulva with a red-hot *dhao* or knife, as punishment for suspected infidelity, and one case as a prophylactic on the Crusader's principle of the iron-drawers.

(*b*) *The female genitals.*—Incised, or even contused wounds of these may prove fatal from loss of blood. Some years ago, several cases occurred in Scotland of murder by wounding the female genitals. In one of these, death occurred in ten minutes; and in another, a wound of the labium three-quarters of an inch long and three inches deep, proved rapidly fatal from loss of blood. A kick on the vulva—like a blow on the

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head—may cause an apparently incised wound, and prove fatal from hæmorrhage (see *Case* below).

Fatal hæmorrhage may, however, occur without external violence, from spontaneous rupture of a large vein in one of the labia, as in a case referred to by Ogston.[1] Wounds of the female genitals are sometimes the result of an accidental fall on some projecting sharp or pointed object. In India, cases of injury by thrusting a stick into the vagina are not uncommon. Harvey states that twenty-five such cases, ten of them fatal, were included in the Bengal, etc., returns for 1870–72. Sometimes such injuries are inflicted after rape has been committed. Similar injuries are sometimes produced in attempts to procure abortion.

Case.—**Death from a kick on the vulva.**—A woman, *æt.* thirty-six, while in a stooping posture, was kicked by her husband in the lower part of the abdomen, and died in about an hour from loss of blood. There was no injury to the vagina or uterus. There was a wound about 1 inch long and ½ inch deep, situated at the edge of the vulva, extending from the pubes along the ramus. The left crus clitoridis was crushed throughout its length, and from this the fatal hæmorrhage had taken place.—Taylor, *Med. Jur.*, I. 678.

Rectum.—Thrusting a stick or other similar object into the anus is a mode of torture or murder occasionally resorted to in India, and the threat to do this is a very common form of abuse. Injuries produced in this way may cause death. Fifteen cases—eleven of them fatal—of the infliction of this form of violence were included in the three years' returns for Bengal, etc., reported on by Harvey. Very often other injuries accompany this form of violence. An individual, for example, is attacked and violently beaten by several others, and finally thrown down and subjected to it. In the majority of such assaults, the victim is a male, and the motive leading to the infliction of the injuries appears to be most commonly punishment for adultery or theft. Possibly, also, in some cases, the injury is connected with sodomy, in the same way as similar injuries to the vagina are sometimes connected with rape. Chevers mentions a case, in which several children, of about eight or nine years old, threw down a boy, one of their number, and killed him by thrusting a small stick into his rectum; and Harvey mentions a similar case, said to have been accidental. But it is to be remembered that dilatation of the rectum, and protrusion of the gut, is a common effect of putrefaction, and hence that such a condition does not necessarily indicate the infliction of this form of injury. Injuries to the rectum and anus are sometimes the result of an act of sodomy (see 'Sodomy').

Extremities.—Injuries to the extremities vary greatly in gravity, according to their situation and extent. Death may result if a large vessel is wounded, directly from loss of blood, or, if the injury is severe, from shock; and slight injuries may contribute to the production of fatal shock in cases where this results from numerous slight injuries. Again, injuries to the extremities may prove indirectly fatal from inflammation and exhaustion, or from supervention of disease; or, if the large vessels or nerves are divided, may necessitate amputation, followed by similar consequences. Injuries to the extremities necessitating amputation, or permanently impairing their power, of course amount to grievous hurt. Obviously, injuries to the extremities may be accidental, or self-inflicted. No further remarks are called for here in regard to

[1] *Lect. Med. Jur.*, p. 486.

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these. As regards injuries inflicted by another, it may be pointed out that very severe injuries of the extremities may be produced without a weapon. Violent twisting of a limb, for example, may cause dislocation of a joint. Again, comparatively slight injuries to the extremities, especially when caused by ropes or cords, may indicate the infliction of very severe **torture.** The nature of the torture thus indicated may be: torture by compression, as when the fingers are tied together and wedges driven in between them, or torture by binding the body or limbs in a constrained position, or torture by suspension. A recognized torture by police to extract confession is to thrust thorns into the quicks of the finger-nails and toe-nails. Harvey mentions a case which shows that suspension head downwards may cause death from congestion of the brain. Cases in which the right hand is completely severed from the body are tolerably often met with in India. This, especially if accompanied by mutilating wounds of the ears or nose, usually indicates punishment for adultery or for theft, as the motive leading to the infliction of the injury.

In the cases of torture by *Baṅs-dola* (see also p. 128), or crushing by bamboos being forcibly rolled over the chest, there may be, if the body is fresh, no external marks of injury, yet the ribs may be broken and the lungs lacerated.

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CHAPTER V.

HOMICIDAL WOUNDS v. SUICIDAL OR SELF-INFLICTED.

"*For murder, though it hath no tongue, will speak.*"

Is the wound '*accidental*,' '*self-inflicted*,' including '*suicidal*,' or inflicted by another, '*homicidal*'? The importance of this question is obvious. In considering it we must remember that in India severe, even mortal, injuries are sometimes inflicted on an individual **with his consent**, by another or others, for the purpose of supporting a false charge.

Case.—**Wounds inflicted by consent** in support of false charges.—Chevers (*Med. Jur.*, p. 358) states on the authority of Mr. Perceval that at one time two or three gangs existed in Bombay who cut and wounded each other for the purposes of extortion. "They used to cut one another's necks and arms by turns as the lot fell, and accuse some rich passer-by of having done it. . . . It fell to the lot of a youthful member of one of these gangs to have his neck cut. The person appointed to cut him was a drunken barber, who, instead of making a slight cut, inflicted a mortal wound. The gang fled, abandoning the youth, whose dying confession led to their arrest."

Case.—In a case before the High Court, Bombay (the Ahmedabad Conspiracy Case), the evidence showed that certain individuals, A B and others, wishing to injure C D and others, proceeded as follows:—They hired two men to wound a third, E, instructing E, after receiving the injury, to first of all accuse them (A B and others) of the assault, and then to make a pretended confession that this was a false charge brought at the instigation of C D and others. This programme was carried out, E very nearly dying, owing to the severity of the wounds inflicted on him, and C D and others were convicted of instigating E to bring a false charge against A B and others. After C D and others had suffered a considerable portion of their sentence of imprisonment the truth was discovered. A and B having brought a civil action for damages for malicious prosecution against C D and others, who were then in gaol, it appeared on the civil trial that A B and others had been instigated by an individual who had kept himself in the background, but was the real mover in the whole plot. A and B, having succeeded in convicting C and D, had caused an attorney's letter to be written to this individual demanding payment of the promised reward! And it was principally by proof of this fact that the real truth came out.

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Case.—**Murder to support a false charge.**—*Reg.* v. *Muhammad Amanji and Husan Amanji* (Bo. H. C. Rep., Vol. VIII., 1871, p. 110).—A summary of the main facts in this case and two others connected with it (*Reg.* v. *Muhammad Valli* and *Reg.* v. *Alibhai Mitha*) is as follows:—It appeared that two factions existed in the village of Karmar in the Broach Collectorate—A and B. Alibhai Mitha and Muhammad Amanji were members of faction A, and Muhammad Valli was a member of faction B. The two factions had a scuffle, in which one of the members of faction B got a blow on the head, and was taken into Broach. On this, faction A held a consultation, at which it was determined to break or bruise the head of one of their own party (Alibhai Mitha's old mother), and take her into Broach as a sort of makeweight against the broken head on the side of faction B. This was done apparently with the consent of the sufferer, and a false charge laid against faction B. While Alibhai's mother was in hospital, Alibhai's faction (faction A) held another consultation, the result of which was that they determined to poison Alibhai's mother in order to have a death on their side instead of simply a broken head. Accordingly they put arsenic into some food, gave it to the old woman, who thereupon was attacked by violent vomiting, which it was stated brought on rupture of the spleen, from which she died. On this Muhammad Valli (a member of faction B) brought his sister out of his father's house and killed her by striking her on the head with an axe. She was heard just before she was struck to say, "Why do you kill me for other people?" Muhammad Valli then dashed his own head violently against a wall—all this appears to have taken place in presence of the girl's father and other witnesses—and a false charge of murder and assault was then laid against faction A. Next Muhammad Amanji, a member of faction A, expressed his intention of killing himself as a set-off against the girl's death. On this his old mother begged that she might be killed instead. Thereupon Muhammad Amanji and his mother went into the backyard of their house, and shortly afterwards the former rushed out, with a wound on his chest, calling for the police *patel* to come and take the deposition of his wounded mother. This was done, and the mother taken into Broach to the hospital. There her wounds were considered slight, and fifteen days after her admission she was discharged, and went back to her village. About six days afterwards her corpse was brought back to hospital. The civil surgeon certified that "these wounds did not bring about the death of this woman; she died of old age." This, however, the court appeared to doubt. In giving judgment, Gibbs, J., remarked: "The evidence shows . . . that there are two factions in this village, and that murders have been committed on each side—not, as would be naturally expected, by members of one faction on a member of the other, but by members of one faction on a helpless female of their own, so as to throw either the guilt of blood or the blame of the crime on the other party. Such a state of things is hardly credible, but this is an instance of truth being stranger than fiction."

Homicide.

Homicide, or the murder of a human being, is the most serious of all crimes, and it is punished as such under British law in India, where life tends to be held rather cheaply.

Causes of homicide in India.—The causes which lead a man in India to commit murder are often trivial in themselves.

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They usually originate in quarrels about land and women, or in robbery and malice.

1. **Connected with sexual relations.**—Under this head may be noticed as more or less common in India (*a*) Murder of *husband by the wife*; here the motive is usually either revenge for ill-treatment or the facilitation of an intrigue, and very frequently poison—often in the latter class of cases supplied by the paramour—is the means resorted to; though in some cases the poison is given as an aphrodisiac or love-philter, and not with homicidal intent. (*b*) Murder by way of punishment for *adultery*: here mutilation of the body of the victim often accompanies the murder: mutilation of the nose, ears, lips, etc., is a not uncommon method of punishing a woman for sexual infidelity. (*c*) Murder of women pregnant from *illicit intercourse*: in such cases the victim is frequently a Hindu widow (a victim of the custom which prevents the remarriage of child-widows), and very often the fatal result is a consequence of injuries inflicted for the purpose of procuring criminal **abortion** (*q.v.*). (*d*) **Infanticide** (*q.v.*), also frequently the result of the Hindu restriction on child-widows. (*e*) Murder of females after violation, or **rape** (*q.v.*): the victim being in some instances a young girl, in others an adult female. Young children (omitting Hun cases in war) are raped first, and murdered afterwards, to destroy evidence. Adults are first murdered to overcome resistance and then raped, as a rule.

2. **Connected with acquisition of property.**—More or less common examples of this are: (*a*) Homicide arising out of disputes in regard to the possession of land. Often such disputes lead to affrays, in which clubs and other blunt weapons are freely used with fatal results. (*b*) Death from injuries inflicted by a gang of robbers or *dacoits*,[1] the injury being sometimes inflicted by way of torture, often by burning, in order to extort information as to the place in which money or valuables have been hidden. (*c*) Murder of young children for the sake of the ornaments worn by them. This is a variety of homicide of tolerably frequent occurrence in India. (*d*) '*Thuggi*' or highway robbery accompanied by homicide. The description of murder used formerly to be often met with in India, strangulation being the means commonly employed. Thuggi, however,

[1] "Where five or more persons conjointly commit, or attempt to commit, a robbery, or where the whole number of persons conjointly committing, or attempting to commit, a robbery, and persons present and aiding such commission or attempt amount to five or more, every person so committing, attempting, or aiding, is said to commit *dacoity*."—*I. P. C.*, s. 391.

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is now rare, and in such cases as now occur, the death of the victim is usually the result of drugging, datura being the agent commonly used. (*c*) Murder by way of punishment for theft is not infrequently met with in India in which thieves caught in the act are set upon and violently beaten, perhaps killed.

3. **Sacrificial.**—Human sacrifice as a religious rite, several cases of which are mentioned by Chevers, formerly widely prevailed in India, but has now been largely suppressed, though it has been on the increase in India in the past few years (1917). The same may be said of the practice of '*sati*,' or widow burning, before alluded to, and of the practice of burying widows alive in their husbands' graves, formerly prevalent among certain castes. Cases of homicide connected with superstition still, however, occasionally occur in India, *e.g.* the killing of individuals suspected of witchcraft, and cases in which death results from the subjection of the victim to an ordeal for the discovery of theft (see *case*, p. 31), or of supposed practice of witchcraft (see 'Drowning,' Chap. VI.). A case of a father sacrificing his son occurred in Bombay in 1901, and another in 1916.

4. **Murder of infants.**—The peculiar features and modes of detecting this crime in India are described under 'Infanticide,' Chap. XII.

The **Victims** of criminal homicide are often unoffending persons. Murder cases often occur in India in which the victims are numerous, and include children or others who have given the murderer no offence. In cases of arsenical poisoning, for example, the victims are often several in number, some being children; and often in such cases the injury to avenge which the murder is committed is of a very trifling character. Again, in 'running *amok*' cases, it frequently happens that some or all of the victims are unoffending persons. Cases also are sometimes met with in India in which an individual, in order to revenge himself on an enemy, kills some unoffending person, sometimes a relation or friend, solely for the purpose of bringing a false charge of murder against the person who has injured him.

Homicide with consent of victim. In India it sometimes happens in a case of homicide that the individual killed has consented to suffer death. Thus, for example, in the cases of homicide for accusation just referred to, the victim is sometimes

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a consenting party to the crime. The custom of the burying alive—'*samadh*'—of lepers, which formerly was widely prevalent in India, affords another example of this description of homicide, as, at any rate in the great majority of cases, the sufferer used to be a consenting party.

Suicide.

Suicide, or 'self-murder,' is regarded by the law as murder, a murder committed by a man on himself; and the distinctions between murder and manslaughter apply also to this. So fully is suicide held to be murder, that every one who aids or abets suicide is guilty of murder.[1] It is in law the same as *felo-de-se* or felony committed on one's self. The expression usually added to the verdict of suicide, namely, 'whilst temporarily insane,' is a legal contradiction, for an insane is held to be incapable of murder, or indeed any criminal act, either upon himself or another.[2] This expression is regarded as a charitable addition to relieve the suicide and his family from the stigma and other penalties of the crime, and for recovering the monies of life assurance.

Curiously enough, although suicide is self-murder, yet an 'attempt to commit' suicide is *not* an attempt to commit murder, but a common misdemeanour (*Regina* v. *Doddy*, 6 Cox C. C. 463).

Causation of Suicide and Suicidal Mania.

It is generally considered that every person who commits or attempts to commit suicide must be insane, at least, momentarily, when they have reached that complexity of mind in attempting to slay himself or herself; but by far the great majority of suicides occur in those who kill themselves without having shown signs of insanity, or such marked signs as would have warranted their restraint by law. Suicidal propensities occur in all forms of insanity, in maniacal, melancholic, and also monomaniacal; but although the onset of suicidal tendencies is readily noticed in insane patients of asylums and precautions are taken accordingly, in civil life these premonitory signs usually pass more or less unnoticed.

What are the incentives to suicide?—The most practical answer to this question that we know of is given by Dr. Wynn

[1] Sir Jas. F. Stephen, *Hist. of Crim. Law*, 1883, III., 104.
[2] R. H. Wellington, *Trans. Med. Leg. Soc.*, 1903, I., 82.

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Westcott, and although his experience lay in London it nevertheless helps us to understand the inner causes of Indian suicide. He says[1] the conditions of life which make life unbearable to the suicide "are very various, seldom single, and often complex. The sufferers from misfortune, passions, disappointments, fear, and pain, although not insane in a legal sense, do essentially differ from those neighbours who do consent to live from day to day under mental or bodily suffering until released by the return of peace and happiness, or by a natural death. It is not possible to define the difference between these two types of person, but the essential difference does exist, and has been the subject of great controversy"; some believing it to be the difference between the pessimist and the optimist, the true believer and the unbeliever, the coward and the brave man. "Some doctors say," continues Dr. Westcott, "that the distinction is based on heredity, or, at any rate, that an instability of character is founded on an imperfect or faulty material basis in the brain and nervous system . . . nor can the characteristic tendencies of the defective state be recognized by symptoms, unless the blot upon the brain be so deep as insanity."

The **proximate causes** of suicide, in Dr. Westcott's long practical study of the subject in London, appear to be seldom solitary. "*In the majority of cases we have found that the sufferer has tolerated much discomfort, pain, or sin, for a long period, and then has succumbed to an added grievance, or to the onset of an overmastering passion.* So that we are able to refer to the basic absence of sufficient *vis vitæ* or the determination to survive; and in addition, to a secondary cause, such as alcoholism, bodily disease, or poverty; and then to a final cause, such as a fit of passion, an attack of pain, or a disappointment in love. In ordinary cases of suicide it is not practicable to obtain sufficient details of life-history to decide on secondary and final causes with accuracy," only approximately.

Direct causes of suicide.—In England, according to Dr. Westcott, "next to *alcoholic excess* (with its loss of occupation, money troubles, family quarrels and *debauchery*) the most fertile cause of suicide is *disease*. The violent pain of acute disease and the prolonged sufferings of chronic disease alike lead to the suicide's grave; incurable diseases are even more commonly found to lead to suicide than such as are very painful. My statistics show that *ten per cent. of suicides are due to illness*, viz. paralysis, influenza, cancer, urethral stricture, prostate, piles, locomotor ataxy, neuralgia, and the angina of cardiac disease; insomnia is a common cause. Hard work and overstrain, worry of business, loss of reputation,

[1] "On Suicide," *Trans. Med. Leg. Soc.*, II. pp. 87, etc.

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family and unfortunate love affairs, and everything that lessens human prosperity affects the mind prejudicially and encourages self-destruction."[1] In France, out of 5922 suicides,[2] $\frac{1}{4}$ were alleged to be due to mental disorder, $\frac{1}{6}$ to domestic troubles, $\frac{1}{5}$ to alcoholism, $\frac{1}{5}$ to poverty and misery, $\frac{1}{7}$ to pain and remorse, $\frac{1}{20}$ to unrestrained passions, $\frac{1}{20}$ to remorse and fear of retribution, and $\frac{1}{30}$ were unclassed.

Causes in India of suicide.—Like the Romans, the Indians approve of suicide under certain conditions—the Greeks did not, and it is curious that the Greek view should agree with the Christian practice in abhorring suicide.

Pythagoras and Socrates took the sentry view of life: the sentry duty might be bitter and laborious, but man has been placed on guard by one of his superior officers—the gods, and was guilty of desertion if he voluntarily quitted his post. On the other hand, the Roman Epicureans held that if life became no longer enjoyable death was the wiser alternative. The Stoics based their approval of suicide on severer and nobler grounds. "How," argued they, "could a man live according to right reason if his body was distempered by disease, his reason decayed or doting, his better will coerced by a political tyranny . . . perhaps crushed by cruel tortures? To these evils the 'ushering of oneself out of life' was a welcome deliverance." Whilst the early Christian view was that pain and sorrow are disciplinary benefits, instead of evils, and that self-destruction since the Council of Arles in 452 A.D. was branded as impious and a felony, so that the body of the suicide was denied burial in consecrated ground, and his property was confiscated.

In modern times, however, amongst civilized nations, there is a tendency to halt between these two extremes,, in that whilst discouraging self-destruction, practically no legal penalties are attached to suicide or attempted suicide in Europe or America, although abetment of suicide is held to be equivalent to murder in England. In India an attempt at suicide is an 'offence.'

For India the following causes of suicide deserve special mention, from their frequency, or peculiar character, and it should be noticed that most of these are also alleged causes of insanity.

Domestic troubles and worries.—The mental distress arising out of quarrels with their husbands, or husbands' relatives, often of a trifling character, is a common cause of the suicide of wives in India; and similar domestic differences are also a not uncommon cause of the self-destruction of the husband.

Remorse and shame.—This is not an infrequent cause of self-murder amongst Hindu women as a result of illegitimate

[1] "On Suicide," *Trans. Med. Leg. Soc.*, II. p. 91.
[2] Analyzed by J. F. Kolb in his *The Condition of the Natives*, quoted by Westcott, *ibid.*, p. 88.

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relations consequent on the custom of enforced child widowhood (see cases in Chaps. XIII. and XIV.); and it also operates in cases of unrestrained passion, jealousy, and indulgence in debauchery, and fear of arrest on criminal charges.

Venereal Disease is a frequent cause of suicide. So much so is this, that Professor Powell states, "In otherwise inexplicable cases of suicide I instinctively examine the penis, venereal disease being a common cause of suicide, sometimes from syphilophobia, more often in cases of persons engaged to be married, or in married men whose wives are expected back from home or the 'Hills' after a prolonged absence."

Fanatic, religious, and imitative.—Self-destruction from religious motives was formerly of somewhat frequent occurrence in India. One variety of this form of suicide consisted in the individual offering himself as sacrifice, in order to propitiate one of the Hindu deities, as, for example, by casting himself under the wheels of the car of Jaggannath, or drowning himself in the Ganges. No doubt, also, in some cases of '*sati*,' or burning of widows on the funeral pile of their husbands, formerly of frequent occurrence in India, the victim was a consenting party, willingly or unwillingly. Several forms of religious suicide have been detailed on pp. 30, 32.

Suicide by **children** is not uncommon in India. Out of 1716 suicides in Bengal 23 were children, and out of 4172 in Oudh 46 were children. The **means** by which suicide is usually committed has already been detailed.

The verdict "suicide while in a state of temporary insanity," so frequently returned by coroners' juries in England, is most probably in many cases the result of the fact that, by the law of England, self-destruction (in a person of sound mind) is a felony (*felo-de-se*) or murder entailing forfeiture of goods and burial in unconsecrated ground, unless the suicide be declared to be of unsound mind, and the average English jury shrinks from calling the suicide a criminal. The law of India, however, contains no provision making the actual commission of suicide an offence, although an attempt to commit it is so (see 'Wounds'). Section 30 of the Coroner's Act (IV. of 1871) expressly declares that it shall no longer be the duty of coroners in India to inquire whether any person dying by his own hand was or was not *felo-de-se*, and further that a *felo-de-se* shall not forfeit his goods.

Frequency.—In England, suicide, which forms about one-tenth of the reported violent deaths, is over 100 per million of population, and is, as in all civilized countries, steadily increasing, the rate having progressively increased from 66 per million in 1861 to 105 in 1903.

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London itself has a rate of only about 90 per million living persons, and has always had a smaller rate than foreign cities, which have been estimated to have the following suicide rate per million living :—Paris, 400; Stockholm, 350; Copenhagen, 302; Vienna, 280; Brussels, 270; St. Petersburg, 206; Berlin, 170; New York, 150.[1]

In India the reported annual death rate from suicide, according to Dr. K. McLeod, ranges from about 50 to 80 per million of population, except in Bengal and the Punjab, which are reported much less.

The **sexual** ratio differs remarkably in English and Indian suicide statistics, in that while in England the suicide death rate among males is three times as high as among females (for the eight years 1887–1905 the proportion is almost exactly 3 to 1), in the different Indian provinces the female suicide rate exceeds the corresponding male rate. Thus in the Madras Presidency, where the rates for the two sexes differ least, the female suicide rate is about one-tenth higher than the male rate; while in the United Provinces, where the rates differ most, the female suicide death rate is on an average about two and a half times as high as the male rate.

Suicides according to Sex per 1,000 Cases (McLeod).

Method.	In Calcutta.		In Provinces.	
	Males.	Females.	Males.	Females.
Hanging	179	346	368	278
Drowning	127	54	354	576
Poison	547	562	168	119
Cuts and stabs	59	16	65	11
Gunshot	37	—	25	—
Otherwise	51	22	20	16

Age.—The suicide rate increases, as in England, from puberty up to fifty or so, and then declines. Child suicide is not uncommon in India.

Mode of Suicide.—The means of suicide vary according to local conditions, such as the presence of a river or lake, or accessibility of weapons or fire-arms, poison, etc. In India, the means chiefly employed are (1) drowning, (2) hanging, and (3) poison. *Drowning* is the mode selected by about

[1] Dr. W. Wynn Westcott, *Trans. Med. Leg. Soc.*, 1904, II 85.

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three-fourths of the female suicides of the Madras and Bombay Presidencies, while more than three-fourths of the male suicides in the same provinces hang or drown themselves in about equal numbers. In the Panjab one-half the male and nearly one-half of the female suicides choose *hanging*, while drowning is selected by only about one-third of the females and one-sixth of the males. Hanging, also, is the mode chosen by over half of the female and about one-third of the male suicides of Calcutta. *Poison*, usually arsenic or opium, is chiefly used as a means of suicide in certain special localities, *e.g.* in districts where the poppy is grown, and in the towns of Calcutta and Bombay. For details of suicide by poison, see 'Poisons.' *Gunshot* is more commonly used by Europeans and Eurasians.

The difference in the mode of death selected by would-be suicides in different parts of India is seen in the following table, from which it will be seen that whereas in Calcutta the favourite means is poison, in other parts of India the preference is for hanging, then drowning, and thirdly poison, whilst females prefer drowning, then hanging and less frequently poison.

MODE OF SUICIDE IN 1000 SUICIDES OF EACH SEX.[1]

	Mode.	England and Wales, 1874 and 1875.	Bombay Presidency, 1873 to 1876.	Madras Presidency, 1872 to 1876.	Panjab (two years, 1872 and 1876).	Calcutta (Town), 1872 to 1876.	Madras (Town), 1872 to 1876.
Males.	Hanging ..	274	382	471	500	326	163
	Drowning ..	184	456	443	174	74	623
	Poison	90	91	26	184	453	86
	Cuts, stabs, etc.	280	71	49	26	84	96
	Gunshot ..	82			32	63	32
	Otherwise ..	90	—	11	84	—	—
Females.	Hanging ..	284	185	179	464	519	42
	Drowning ..	309	767	790	354	26	937
	Poison	155	37	26	84	429	21
	Cuts, stabs, etc.	182	11	2	18	26	—
	Gunshot ..	2			—	—	—
	Otherwise ..	68	—	3	80	—	—

The various forms of suicide and questions therewith are detailed under the respective modes of fatal violence, wounds, etc.

[1] K. McLeod, *On Suicide in India.*

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PLATE III.



SELF-INFLICTED WOUNDS, FEIGNING ATTEMPTED HOMICIDAL WOUNDS.
(On left upper arm.)

To face p. 151.]

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Is the Wound Homicidal or Suicidal or Self-inflicted?

This question is answered by: (1) The *appearance* and *position* of the wound. (2) The *direction* of the wound. (3) The *number* of wounds or injuries. (4) The *position and surroundings* of the injured individual.

1. Appearance and Position of the Wound.

Although in many cases, these characters afford no indication as to how, or by whom, the injury was inflicted, a presumption more or less strong arises from the following circumstances:—

Against self-infliction and in favour of homicide or accident, in the case of stabs passing right through the body, and cut throat extending to the vertebræ, these being rarely self-inflicted wounds.

Case.—**Suicidal cut throat,** wounding vertebra.—Dr. A. Powell relates a case of a European who committed suicide with a razor and hacked the vertebra without wounding the carotids. He did this by throwing his head back during the operation. In this position the carotids are on a plane posterior to the anterior surface of the vertebra.

Case.—A Hindu male, aged 35, committed suicide in the court lock-up, Bankipore, on 17th July, 1897, by cutting his throat with a knife. His body was examined the same day. Marks of injuries: a transverse incised wound in front of the neck, about five inches long and four inches broad, down to the spinal column; the trachea was divided just below the cricoid cartilage; the œsophagus and the right carotid artery were cut through. The divided portions of the trachea were much retracted.—Purno C. Singh, *Ind. Med. Gaz.*, 1902, p. 236.

Case.—Taylor, *Med. Jur.*, I. pp. 512 and 513, mentions two suicidal cut throat cases, in which the spine was wounded. In the first (Ryan's case) there were three cuts on the vertebra, but the large vessels of the neck were unwounded. In the second (Marc's case), respecting which Taylor remarks that a wound so extensive is rarely seen in a case of suicide, the large vessels were wounded, the windpipe and gullet cut through, and the vertebra grazed.

So also stabs, and incised wounds on the back, and gunshot wounds, unaccompanied by any blackening of the skin or scorching of the clothes, are only likely to be self-inflicted if some special contrivance has been used to fix, or in the case of a gunshot wound to fix and discharge from a distance, the weapon employed. Several *contused* wounds are only likely to be self-inflicted if the person is insane, or the case is one of suicide by precipitation from a height.

In favour of self-infliction.—In the case of incised wounds, if these are all slight, or if severe they tail off at one end into a superficial scratch, and are in the accessible position on the

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left side in the case of a right-handed individual (see *Plate I.*), the presumption is in favour of self-infliction. In suicidal cases, in about four-fifths of the cases the head is chosen for injury.

Case.—**Self-inflicted wounds** feigning homicidal.—The Lansdowne Road Mystery.—Flora McLeod (see *Plate I.*) was nurse to a European family in Calcutta in 1901. She had the baby of the family in her charge, and one night it was found dead. The nurse ran out into the verandah and alleged that a native had come into her room at midnight and stolen her jewellery, had knocked her down in the bathroom and stabbed her repeatedly and killed the child. The stabs, 14 in number, were skin deep and evidently self-inflicted. The scratches were all on the left upper arm. All were distinct scratches, and considering their length compared with the circumference of the arm, could not have been inflicted by stabbing thrusts with a dagger or knife. The police believed that she produced them with the point of a pair of scissors. They were in a position where she could conveniently produce them with her right hand. The police surgeon gave it as his opinion that they were self-inflicted. The child was 16 months old and was reported to have died of suffocation. It transpired that proceedings for a divorce were being taken against accused by her husband. No trace of the alleged burglar was found.

Case.—**Wounds self-inflicted** in support of false charge.—" In 1853 three native women and two children were found lying dead in a heap with their throats cut in their bungalow at Betul. The husband of one of the females gave the alarm, stating that the crime had been committed by dacoits (gang-robbers), who had also wounded and bound him! It, however, soon became evident that this man was the murderer." . . . His wounds were very slight, the chief one being on the thigh, about " three inches long, and in no part penetrating completely through the true skin "; the others were shallow scratches exactly parallel to the first, and the amount of blood on his clothes and body was much greater than could have flowed from his wounds.—Chevers, *Med. Jur.*, p. 357.

Case.—" A Mussulmani at Dehra Ismail Khan, examined by Surgeon G. P. Mackenzie, in September, 1872, had a slight cut scarcely skin deep, and two or three smaller scratches on throat. She accused her husband of attempting to murder her. The injuries were pronounced to be very trifling, and probably self-inflicted. She was convicted of bringing a false charge, and sentenced to six months' imprisonment."—Harvey's *Beng. Med. Leg. Rep.*, p. 117.

In favour of infliction by another person, in cases where severe incised wounds are accompanied by cuts on the hands of the injured individual, and in female subjects—if the circumstances exclude accident—in cases of wounds of the genitals, or castration, or mutilating wounds of the nose, ears, or breasts. In India, wounds in females in the situations just mentioned indicate jealousy, or punishment for adultery as the motive for their infliction; and wounds of the genitals in male subjects often also indicate the existence of the last-mentioned motive or religious monomania—as melancholics sometimes make a clean sweep of penis, scrotum, and testes. Blows or cuts on

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the head inflicted by a right-handed person are usually on the left side of the victim, if on front.

In favour of accident—the location of the wound on an exposed part of the body and one side only.

2. Direction of the Wound.

It may first be noted that while a non-self-inflicted wound may have any direction, a self-inflicted wound usually has a particular direction, dependent on the part wounded and the hand employed. Hence it is important, where possible, to ascertain whether the injured individual is, or was, right or left-handed, or ambidextrous. Next, an endeavour should be made to determine the beginning and ending of the wound: this, of course, presents no difficulty in the case of punctured and non-traversing gunshot wounds. In traversing gunshot wounds, the beginning and ending of the wound are indicated by respectively the orifice of entry and the orifice of exit. It, however, by no means follows that the direction of such a wound is represented by a straight line drawn from one orifice to the other. For example, a projectile may be deflected by a bone or by tough fascia, and take a circuitous course, *e.g.* may be deflected by a rib, and pass half round the body without penetrating the chest, or pass half round the head without penetrating the skull.

Dr. A. Powell cites a case of a sergeant of the 8th Mounted Infantry in the Boer War hit by a Mauser bullet close to the spine. The entrance wound was linear. The bullet travelled right round the ribs and was removed from below the skin close to the sternum between the third and fourth costal cartilage. Had it come out of itself the exit would doubtless have been much smaller than the entrance wound.

In the case of incised wounds made by a drawing-cut, if one end is abrupt, deep, and unbifurcated, and the other shallow, and tailing off, or bifurcated, the probabilities are that the former is the beginning and the latter the ending of the wound. In deep incised wounds, the plane of the wound must be noted (see *Case*, p. 159).

Self-inflicted incised wounds, as a rule, (1) end on the same side as the hand employed, and (2) begin from below if on the lower part, or from above if on the upper part of the body. Self-inflicted incised wounds of the throat, as a rule, possess the first of these characters, but may or may not possess the second, *i.e.* they may be transverse, or run from above down,[1] or from below up. Self-inflicted stabs and gunshot

[1] K. McLeod, from the cases reported in Bengal in 1869, considers that suicidal wounds of the throat are generally high up on the neck, between the

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wounds (in right-handed persons) run, as a rule, from right to left.

Homicidal wounds may have any direction, and are specially liable to have the same direction as self-inflicted wounds if the assailant was standing behind his victim, at the time of inflicting the injury (see *Case*, p. 159). Frequently in homicidal wounds the direction of the wound indicates the relative position of the assailant and victim ; it must be recollected, however, that the direction of the cutting edge of some weapons is transverse to the line of the handle. This is the case in the carpenter's adze, and the mattock (*gainti*) or spade-hoe (*phaora* or *kudali*) commonly employed by cultivators in India.

3. Number of Wounds or Injuries.

A **single** wound or injury may be the result of accident, self-inflicted, or inflicted by another. When many wounds are present, self-infliction and accident are, to a certain extent, contra-indicated. Multiple wounds may, however, be :—

(*a*) **Self-inflicted.**—Several incised wounds, all slight, are sometimes self-inflicted, with the object of averting suspicion (see *Case*, p. 152); or of supporting a false charge (see *Case*, p. 152). In suicidal cases also, *e.g.* cut-throat, one severe incised wound is sometimes found accompanied by other slight cuts. More than one severe incised wound may, of course, be self-inflicted, but the greater the number the stronger the indication in favour of homicide. Several contused wounds are only likely to have been self-inflicted in the case of insanes, or in cases of suicide by precipitation from a height. Suicide by precipitation excluded, self-infliction is contra-indicated, if each of two or more wounds is of such nature as to cause immediate insensibility, or immediate death. Very severe wounds, however, may not cause immediate death, or immediate insensibility, and hence the existence of two such wounds may still be consistent with self-infliction ; *e.g.* Hayes Agnew concludes from recorded cases that it is possible for a suicide to shoot himself "first in the head, and within the lapse of a minute inflict a similar wound on the heart," or *vice versâ*.[1] Very great caution, therefore, must be exercised in drawing a

hyoid and thyroid, more on the right than on the left side, and are either transverse or incline from below upwards.—*Beng. Med. Leg. Rep.*, 1869, p. 57. Casper, however, while admitting the difficulty of ascertaining the commencement and end of wounds, states : "In suicidal wounds of the throat the wound certainly usually runs from left to right and from above downwards."—II. p. 13.

[1] *Annals of Surgery*, Vol. VI. p. 152.

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positive inference against self-infliction, simply from the fact that more than one severe wound is present on the body.

(*b*) **The result of accident,** *e.g.* a fall from a height, an accident from machinery, etc. In such a case, however, homicidal violence is not contra-indicated, unless all the injuries are to be accounted for by the supposed accident. Thus when the accident indicated is a fall from a height, and there are no projecting objects against which the body could have struck during its descent, severe injuries on both sides of the head contra-indicate accident (see *Cases,* below and p. 159).

4. Position and Surroundings of Injured Individual.

Under this head should be noted :—

(1) **The position** and attitude of the body and its relation to surrounding fixed or large objects.—This may directly indicate self-infliction or accident, as, for example, when the body is found at the foot of some high object, from the top of which it may have fallen. It must be borne in mind, however, that an attempt is sometimes made to conceal murder by placing the body of the victim in such a position as to point to accident or self-infliction as the cause of the injuries. With this object the body (as in *Case* below) may be placed at the foot of a high tree, or on a railway line, etc.

Case.—**Attempt to conceal** homicide by fabricating evidence of accident.—The body of a man was found at the foot of a mango tree, with a bundle of mangoes tied round the neck. On the body was: (1) Around the lower part of the neck, extending from right side of trachea to posterior edge of left sternomastoid muscle, a brown mark, as if from pressure of a cloth or large cord. (2) Abrasions and scratches with dust adhering, on right front of chest and anterior and outer aspect of right arm. (3) On right side of face and neck several bruises elongated in shape. (4) Bruises and abrasion over right parietal protuberance. Blood in large quantity extravasated under scalp. All right half of the skull broken into fragments, fissures radiate in all directions, all the fragments irregular in shape, and lying loose on the brain. An opinion was given that the injuries were caused by blows from a weapon, not by a fall from a tree. Subsequently one of the accused confessed that he, deceased, and several others, had been stealing mangoes, when a dispute arose as to the division of the plunder, and some one knocked deceased down with a lathi. The body was then conveyed some distance (probably dragged along the ground) and placed under the tree, so that it might appear that a fall therefrom was the cause of death.—Asst.-Surg. Duncan in McLeod's *Beng. Med. Leg. Rep.*, p. 41.

In such cases discrepancies between the nature and situation of the injuries, and the method of production indicated by the position of the body, point indirectly to the employment of homicidal violence. In other cases also indirect indications

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of the employment of homicidal violence may be afforded by the position and attitude of the body. This is so when the injuries present are of such a nature as to make it improbable that the position and attitude in which the body was found resulted from effort on the part of the injured individual. For example, the body may be found at a distance from the place of infliction of the injury, or in an attitude widely differing from that in which it must have been in, directly after its receipt, *e.g.* the cause of death being fracture of the skull from a blow on the back of the head, the body is found in an upright position, supported against a high thick hedge at its back. The possibility, however, even when the injuries are extremely severe, of considerable effort on the part of the injured individual must not be overlooked. It has already been pointed out that a certain amount of power of voluntary movement may still be retained after receipt of very severe wounds, and it now may be pointed out that very considerable power of locomotion may remain, even after the receipt of almost immediately mortal injuries.

Case.—**Locomotion** after mortal injuries.—Dr. A. Powell relates a recent case, in which a boy of 18 ran at least 120 yards from where he was mortally shot through the heart. *Post mortem* examination showed that a buckshot had pierced the anterior wall of left ventricle and lodged in the interventricular septum.

Case.—He also gives a case of a man who was stabbed by a pitchfork and was driven three miles and lived in hospital for four hours before he died. The *post mortem* examination showed left auricle to have been penetrated.

Case.—An old man was severely beaten with a split bamboo; after the beating he walked to his house, a distance of about half a mile, and died almost immediately. On *post mortem* examination, the seventh and eighth ribs on each side were found fractured, the spleen ruptured, and the right lobe of the liver all but divided transversely by a bifurcated rupture 8 inches long and $1\frac{1}{2}$ inches deep and broad.—*Ind. Med. Gaz.*, 1867, p. 200, Dr. Hutchinson.

(2) **Condition of surface of the body,** or of the clothes or other coverings thereof.—Important points to note under this head are: (*a*) Peculiarities of the clothes likely to have modified the injury received, or to affect the condition of the weapon used, *e.g.* a thick turban may cause a severe blow from a blunt weapon to produce a simple, instead of a compound, fracture of the skull; or fibres derived from an article of clothing worn over the injured part, may be found adhering to a weapon, and thus indicate it to be the one which was used. (*b*) Stains of blood or other matters. It is possible that these by their nature or position may indicate homicidal violence, *e.g.* stains of seminal fluid on the clothes or body of a female corpse, or a mark of a bloody right hand on the right hand or arm of injured

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person. Again, in the case of gunshot wounds, blackening of the skin at, or of the clothes worn over, the seat of the wound, by indicating nearness to the body of the weapon at the time of its discharge, is confirmatory evidence in favour of self-infliction; just as the absence of such marks by affording a contrary indication, is evidence of more or less weight against self-infliction. Stains of mud or dust on the surface of the body, with abrasions in certain situations on the skin, may indicate dragging of the body along the ground, and afford possibly, confirmatory evidence of homicidal violence. (*c*) Cuts or rents on the clothes. Want of correspondence in situation between cuts on the clothes and wounds on the body is often found when the wounds have been self-inflicted for the purpose of supporting a false charge, or averting suspicion.

(3) **Nature**, position, and condition **of objects** on and near the spot where the body was found, or the injury inflicted.—The objects found may be weapons, sharp stones, articles of clothing, fragments of clothes, etc., and these or other objects may bear stains of blood. Again, near the body or place of injury may be found bullet-marks, footprints of persons other than the deceased, or marks indicating that a struggle has taken place. If a weapon is found, its position is of importance. This may indicate self-infliction, as, for example, when the weapon used is found tightly grasped in the hand of the dead body, as already instanced. A weapon, however, found loosely lying in the hand of a dead body, may have been placed there, with the view of fabricating evidence in favour of suicide (see *Case*, p. 159). The discovery of the weapon used, at a distance from the body, indicates homicide, in proportion to the improbability of its having been placed where it was found, by the deceased. Here, obviously, the question of what power of effort or locomotion remained to the deceased after receipt of the injury, must be considered. As regards the nature and condition of the weapon found, it may be pointed out that peculiarities in its shape, etc., by their agreement with the shape of the wounds on the body, may indicate it to be the weapon which has been used, and this again may be confirmed by the weapon showing signs of recent use. Marks, again, indicating ownership, present on the weapon, may be important as evidence in favour of the guilt or innocence of the accused. The non-discovery of the weapon used, especially if the injuries are likely to have caused rapid death or insensibility, obviously points to homicide. As regards sharp stones, the presence or absence of these is of importance as indicating the possibility or otherwise of the injuries being caused by forcible accidental contact therewith.

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A compound fracture of the skull, for example, a common result of a blow with a blunt weapon, may be caused by a fall on a sharp stone, but is an exceptional result of a fall on a flat surface.[1] As regards articles of clothing or fragments of clothes, the presence of these near the body, or grasped in the hands of the deceased, may indicate that a struggle took place shortly before death between the deceased and some other person, and thus indicate homicide. Fragments of hair, again, belonging or not belonging to the injured person, may be found in similar situations, or adhering to weapons, and may prove of much importance in evidence. Stains of blood may be found on a weapon indicating its recent use, or on other objects in the neighbourhood of the body or the spot where the injury was inflicted. Sometimes the appearance and position of such stains is important as indicating the circumstances under which the injury was inflicted (see *Cases*, pp. 153 and 159).

Case.—**Circumstances under** which wounds were inflicted inferred from position and form of blood spots.—In the case of Spicer, a woman was killed by a fall down a stair, fracturing her skull and spine. A branch of the right temporal artery of the deceased was found divided, and on the wall at the top of the stair, on the right hand going up, several spots of blood were found, of the form and appearance of spots resulting from the spouting of a small artery. From the form and position of these spots, it was probable that deceased received a blow on the head while ascending the stair, and fell backwards to the bottom, the fall causing the injuries which resulted in her death.—Taylor, *Med. Jur.*, I. p. 549.

Bullet-marks or shot-holes, by their situation, may indicate the position of the assailant at the time the weapon was discharged (see *Cases* below). The distance at which the shot was fired is usually related to the question of premeditation, as it is manifest that a shot fired from a considerable distance could not have been fired in the heat of a sudden quarrel.

Case.—**Evidence from bullet-marks.**—Several shots were maliciously fired into a church. Some of the bullets traversed a window, making holes in the glass, and struck against a wall on the other side of the church. A straight line from these two points reached a window on the opposite side of the street, from which it was afterwards ascertained that the shots had been fired.—Taylor, *Med. Jur.*, I. p. 689.

Case.—"Sir Astley Cooper, called to see Mr. Blight, of Deptford, who had been mortally wounded by a pistol-shot, inferred from an examination of the localities that the shot must have been fired by a left-handed man. The only left-handed man on the premises at the time was a Mr. Patch, a particular friend of the deceased, who was not in the least suspected. This man was, however, subsequently tried and convicted of the crime, and made a full confession of his guilt before execution."—Woodman and Tidy, *Med. Jur.*, 1091.

[1] *Beng. Med. Leg. Rep.*, p. 53.

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As regards **footprints,** Ogston[1] remarks that the impression left by the naked foot varies in the same individual according as to whether he was standing, walking, or running at the time. Lastly, objects in the neighbourhood may be found overturned, broken, or showing marks of injury, pointing to a struggle having taken place.

As an illustration of the application of many of these points to a particular case, which in itself exhibits many points of interest, the analysis of the case of the *Empress* v. *Sudhabode*, by Dr. E. G. Russell,[2] is interesting also as a case of special pleading for the prosecution.

Some of the obvious defects of Dr. Russell's reasoning are pointed out in remarks enclosed within square brackets. He does not appreciate the fact of the extreme rarity of "cadaveric spasm"; nor does Taylor if by "thus frequently" (p. 164) he refers to cadaveric spasm. It is time the profession recognizes the extreme rarity of cadaveric spasm. Nor does he think it probable that a razor could be notched by striking the bone in suicidal cases; whereas Professor Powell has cited a case of a razor notched by undoubted suicides in which he found the steel fragments embedded in the vertebra. Nor can anything be inferred from the "expression" of a corpse; the muscles of expression relax in death, and practically all faces are placid unless decomposition has set in, or the jaw has dropped—phenomena which have nothing to do with the passions or temper of the man immediately before death.

Case.—**Fabrication of evidence of Suicide in Homicidal cut-throat.**—*Imp.* v. *Sudhabode Bhattacharji.*—A native girl, aged 11 years, was found dead in her bed with her throat cut, and a blood-stained razor in her right hand. She and her husband had retired to their bedroom at 10 P.M. on the 12th September (1888); the husband left the house at 4 A.M. on the 13th; information of the girl's death was given to the police at about 1.30 P.M. on the 13th. *Post mortem* examination was held at 7.30 A.M. on 14th.

THE POINTS WORTHY OF SPECIAL NOTICE WERE:—

1. Absence of all signs of a struggle, such as cuts on hands, bruises (either on, or beneath, skin), marks of ligature (compression of nose, or mouth); hair not disarranged or cut; clothes not torn or cut.

2. Face calm, eyes half open.

3. Trachea divided between 4th and 5th rings (*i.e.* near sternum), while the wounds of spine were 1½ inches or more higher up. [Dr. R. uses 'spine' very frequently, meaning doubtless spinal column or vertebra.]

4. Three wounds of spine and of gullet, although tissues of right side

[1] *Lect. on Med. Jur.*, p. 63.
[2] *Ind. Med. Gaz.*, 1889, pp. 33, etc.

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of neck marked by *one* incision only like those on left side; tracheal wound also single.

5. Plane of wound upwards; direction transverse, crescent-shaped; both ends equally high.

6. *Rigor mortis* well marked and universal; both hands in identically same attitude as regards fingers, and firmly fixed so by *rigor mortis.*

7. Razor loose in right hand, not clasped or even touched by the fingers.

Points establishing Homicide.—I. Wounds.—(*a*) Severity. (*b*) Order. (*c*) Direction. (*d*) Redundancy. (*e*) Plane. (*f*) Lowness on neck. (*g*) Regularity. II. The bleeding.—(*a*) Direction. (*b*) Nature of stains on right hand and arm and on clothes. III. Razor in right hand—value of this fact. IV. Death almost instantaneous. V. Wounds were inflicted during life, and were the cause of death. VI. Absence of cries and of signs of struggle. Each of these points deserve separate consideration.

I. Wounds.—(*a*) The severity. The head was nearly cut off; both common carotid arteries, both internal jugular veins, the pneumogastric and phrenic nerves on both sides, all the muscles of front and sides of the neck were divided, as were the trachea and œsophagus; the cervical spine was cut. In addition to this wound, there were two others, each reaching to and wounding the spine. It will be shown (*b*) that the upper and great wound, which divided every structure of front and both sides of the neck, was probably the first inflicted. After infliction of such a wound, could deceased have inflicted two others, each penetrating to and wounding the spine, and each involving a distinct and determined act of volition? Taking the wounds in any other order, could a suicide have inflicted the two others after any one of them? It is true that authorities on legal medicine have stated that severe and extensive wounds of the throat have been inflicted by suicides (Guy, 3rd Edn., p. 298). Taylor (3rd Edn., 1883, Vol. I. p. 513) also says, "there is no ground for the assertion that extensive wounds of the throat are incompatible with self-destruction." This is, however, qualified by a further opinion expressed by Taylor (*idem.*, p. 519) peculiarly applicable to the present case, which will be quoted later on (in case *Reg.* v. *Edmunds*). The extensive nature of the wounds must, moreover, in the present case, be considered in relation to the age, sex, and state of mind of deceased, the race tendencies, and the nature of the weapon used. Deceased was an immature, non-muscular girl of 11 years. The tendency of female suicides in India, especially of those of tender years, is to destroy themselves by means (poison, hanging, etc.) other than the use of cutting weapons. Moreover, although, as is well known, insanes will inflict on themselves injuries extreme in severity, and showing astonishing persistence and determination (see Taylor, 3rd Edn., 1883, Vol. I. p. 512), yet there was no allegation or question of insanity in the case of deceased —the evidence, in fact, indirectly establishing the reverse. With regard to the weapon found in the right hand, and with which the wounds must have been inflicted had they been suicidal, this was a razor of ordinary pattern. Deceased can have had no skill in the use of such a weapon; could have had no occasion probably ever to have handled one. Yet to have inflicted wounds in any way approaching in severity those found on deceased, a suicide would require some knowledge of the use of a razor, and must certainly have exerted a degree of muscular strength which the deceased, an immature, non-muscular girl of 11, did not in my opinion possess. In most of the cases in which exceptionally severe injuries have

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been self-inflicted—more especially by women—the weapon has been a knife with a fixed handle, lending itself readily to a firm grip—not a razor, with a loose blade. (See below.) It will be instructive to compare with the present case, certain others which are collected by Taylor as typical of exceptionally severe injury in cut-throat cases.

Case.—**Suicidal cut-throat.**—Woman; spine wounded in two places, *but* through muscles of back and of side of neck; left internal jugular vein opened; all other large vessels escaped, and *all* the large nerves; other incisions. (Taylor, 3rd Edn., 1883, Vol. I. p. 528.) Note.—Person, an adult; maniacal; weapon, a table knife, *i.e.* with a firmly fixed handle easy to grip; all large vessels and nerves escaped injury—except left internal jugular vein; the spine was reached (and wounded) through the back parts of neck, not through the *front*, where the important structures lie. Taylor says of this case that it "*might* be suicidal"; but the verdict was one of murder. [Here Dr. Russell disregards the verdict in heading case "suicide."] Compare present case:—All large vessels and nerves of neck divided; spine cut in three places, girl of 11, weapon (razor) with loosely jointed handle, no grip; no suspicion of lunacy.

Case.—*Ryan's* case.—Man; three cuts on spine of neck; *but* both carotids and jugulars escaped, and therefore, almost necessarily, all large nerves. (*Ibid.*, p. 512.) Quoted as a case of exceptionally severe injuries for a suicide—even for an adult male, probably accustomed to use of a razor.

Case.—*Marc's* case.—All muscles of front of neck, the windpipe, gullet, both jugulars, both carotid arteries divided: and the weapon had "even grazed the anterior ligaments of the spine." Taylor adds (*ibid.*, p. 513), "A wound so extensive as this is rarely seen in a case of suicide . . ." Compare present case:—All great arteries and veins and nerves of neck divided and not merely anterior ligaments of spine "*even* grazed," *but* three incisions into spine of neck. Although the above three cases are placed on record as of exceptional severity for suicide, yet in no one of them is there an approach to the severity of injury found in the present case; even though in the former, all the conditions favoured exceptional severity, viz. adult age, male sex, or if a woman, the presence of mania and the use of a knife with fixed handle.

Case.—*Reg.* v. *Edmunds.*—Three incisions, front of neck; all the great vessels and nerves divided; also trachea and gullet; two wounds of spine, deep ones. This greatly resembles the present case (K. Manini Debi). Held (although deceased was an *adult*) that "it was impossible for any person to inflict such injuries on himself." Taylor adds: "The hacking of the spinal column in two distinct places . . . *after* [what evidence that it was after?] the carotid arteries and jugular veins had been cut through was alone sufficient to justify this opinion. Suicide may graze the ligaments in front of the spinal column, but that they should make deep incisions into the bones . . . is a proposition contrary to all [not so] experience and probability."—*Ibid.*, p. 518.

Case.—Case of *Earl of Essex.*—To the effect that repeated wounds of the front of spine could not have been self-inflicted, because the division of the vessels and nerves, which must have first been cut, would have rendered the person powerless. When, in these cases, the injuries were held to have been impossible of self-infliction, even by adults, can it, for a moment, be accepted that injuries of as great severity could, in the present case, have been self-inflicted by an immature girl of 11 years of age? I maintained the improbability—nay, impossibility—a view which the jury unanimously endorsed. His Lordship, in summing up,

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observed: "On this point, there was not a doubt in the world the wounds were homicidal and not suicidal."

(*b*) and (*c*) Direction and order of infliction of the three wounds of the neck. The great wound had the appearance of having been inflicted from left to right; for its left extremity was shallow for two-thirds of an inch, and then rapidly deepened; while its right extremity ended in a shallow tail 1½ inches long, the skin being alone injured at its termination. This great wound had apparently been caused by a single sweeping incision; for its upper margin was entire and clean cut: neither skin nor tissues showing any sign of two incisions having run into one another; no notch or tag anywhere. Now, although the spine and gullet had three incisions in them, the windpipe and the divided tissues of the right side of neck had only a single incision through (or touching) them, just as those of left side had. How was this to be accounted for? It seems clear that the two lower wounds, which showed superficially a little to left of median line of neck for ½ inch, and then disappeared into the great wound, must have found a gaping opening and dropped into it straight to the spine, which each wounded. A previous incision must have existed, and the tissues have been gaping from its retraction.

If it be assumed that either of these lower wounds was the first inflicted, then the tissues of right side of neck must have been divided by it; these had only one incision; therefore, in that case, the great upper incision which began on left side of neck cannot have cut the tissues of right side, and therefore must have joined in, towards the median line, with the pre-existing one of right side. Had this been so, it is scarcely possible that there should have been no sign of the junction. There was none. The upper margin of the great wound was clean cut and entire through its whole length. The great incision round both sides of neck was then the one first inflicted. This being granted, the improbability of deceased having been able to inflict the other two wounds is far greater than if either of the lower ones had been the first; as the former divided the structures of both sides of neck, the latter could only have divided those of the right side. Not only the great upper wound, but also the two lower ones must have been inflicted from left to right. For, had they been inflicted in reverse direction, what could have caused them to leap up almost vertically from the spine (which they cut) nearly 1½ inches to become superficial almost at once? It was not contact with the inner end of left clavicle, for this was untouched; nor mere contact with the spine, for the great incision wounded the spine equally, and still kept on its deep path.

The appearances were only capable of explanation on the supposition of the two lower incisions having begun as the shallow incisions described on the right side of median line, and, therefore, having been inflicted from left to right. The mere direction of all the incisions—from *left* to *right*—had no great practical bearing on the question of homicide *v.* suicide, for deceased, a right-handed person, would herself have cut in that direction. The direction is that in which a right-handed person inflicting the wounds, homicidally, from behind deceased, would have made them; this fact supports the theory advanced as to the method of commission of the homicide.

(*d*) Redundancy and severity of the wounds was marked and far in excess of what was necessary to take life. That redundancy is far more frequent in homicidal than in suicidal wounds is well known. The frequency of cases of attempt to commit 'suicide' in the Police Courts and Hospitals is confirmatory of this question. Dr. K. McLeod has shown that Indian records firmly establish this fact (*Med. Leg. Ret., Beng.*, 1869).

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(e) Plane of wounds, upwards. This is rare in *suicidal* wounds; more common in homicidal ones; most common when the latter have been inflicted, from behind, on a person lying down. In the latter case, the plane of the wound is almost necessarily upwards. Proofs that the plane was, in this case, upwards:—

1. Skin and soft parts.—Although retraction had greatly altered the relative position of the parts; yet, taking the upper margin of the great wound, its ends were from 1½ to 2 inches higher than its middle.

2. Tracheal wound.—This was, in front, between the 4th and 5th rings; posteriorly, it divided, obliquely upwards, the ends of 4th ring.

3. Incision of spine.—Plane upwards.

4. The difference in level between the wound of the trachea and those of the spine (behind it) was about 1½ to 2 inches. The tracheal wound, between 4th and 5th rings, was on a height with lower third of body of 7th cervical vertebra. "The lower wound of spine was at upper part of body of 6th cervical vertebra; the higher was on lower part of body of 5th. The wound had, in passing from windpipe backwards to spine, risen about 1½ to 2 inches. If the head of deceased had been drawn backwards at time of infliction of the wounds, this would, no doubt, account for much of the difference of level; but not, I think, for all. For, in my experiments (on the dead subject), I could not raise the level of the 5th ring of the trachea more than one inch, even by traction of the head backwards, which sufficed to draw the body along the table.

(*f*) Lowness in the neck of the wounds. Suicidal wounds are rarely low in the neck; they are usually high up, in a region of hyoid bone or larynx. Homicidal wounds are frequently low down. General experience confirms this (see also Taylor, 3rd Edn., 1883, Vol. I. p. 512).

(*g*) Regularity of the wound has been held to indicate suicide by some, homicide by others. In the case of a struggle, it is probable that a homicidal wound would be irregular. But, on the other hand, "a murderer by surprising his victim from behind, . . . by directing his attack against one who is asleep . . . may easily produce a regular and clean incision of the throat."—*Ibid.*, p. 513. A suicide requires a steady nerve to make a regular, clean-cut wound, especially when a large one. Could a girl of 11 years of age be credited with the amount of nerve required to nearly decapitate herself with steadiness and regularity?

II.—The Bleeding.—(*a*) Direction of the blood effused. All the blood effused from the wounds of the neck had run directly backwards, towards the back, sopping with blood the posterior parts of the body and trunk. There were no marks of any stream of blood having run down the neck, chest, shoulders or clothes, *i.e.* in direction from head to feet. This shows that deceased must have been lying on her back during the whole time that bleeding was going on, *i.e.* from infliction of wound to death. This fact was of the highest practical importance in the case. For I gave it as my opinion that it was impossible for deceased, while lying on her back, to carry a razor so far round the throat as the wound extended (*i.e.* all around, except for 1½ inches behind), and at the same time keep the cutting edge against the throat; on the right side (the right hand being used), the hand could not be got round so far unless the head were raised to enable it to get beneath. That deceased's head was not so raised is almost certain, for had it been, even for a moment, blood would have streamed down the neck and chest or shoulders, and told the tale; for bleeding was at that time going on, the vessels having been severed. There were no marks of any such streams.

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Moreover, it is rare for a suicide to cut the throat in a recumbent posture. (Taylor, Vol. I. p. 545.) See also cases: *Reg.* v. *Courvoisier*, *Reg.* v. *Constance Kent*, and *Reg.* v. *Gardner*.

(*b*) Nature of the blood-stains on right hand and arm. The right hand had blood-stains over every part, as if dipped in blood. The right forearm was free of blood, except along its lower and inner edge, where it had lain in contact with the blood-sopped clothes. There was no mark of a jet or spurt of blood, nor of any individual drops, on this hand or arm or on clothes of deceased. If the case had been one of suicide, the right hand (containing the razor) must, at the moment of severing the vessels, have been in close contiguity with them. The arteries, especially the smaller ones, would have at once jetted out blood on being cut. Could the hand and forearm, if naked, or the clothes, if covering them, have completely escaped being marked by such jets? They had entirely escaped.

III.—Razor in right hand—value of this fact. At the time of *post mortem* examination, the razor was found loosely supported in the right hand between the upper phalanx of thumb and the palm; the fingers did not touch. The case was, however, complicated by the razor having been removed while the body was being conveyed to the dead-house, and afterwards replaced before I saw it. The Inspector, who saw the body *in situ* on the bed before removal, deposed that the razor was at that time not tightly clenched, that he removed it easily without any force, his object being to prevent it falling out and getting lost on the way. The defence strongly contested the point whether the razor could not at some earlier period than that at which I examined the body have been firmly grasped by cadaveric spasm. It was admitted that, had the razor been firmly grasped by cadaveric spasm, it would have been telling evidence in favour of suicide.

Taylor notes (Vol. I. p. 65): "Razors and pistols are thus *frequently* found in the hands of suicides." Had it ever been so grasped, in the present case, it could scarcely have arisen from any cause other than the fixation by cadaveric spasm, at the moment of death, of a voluntary grip of the weapon during life. For this condition cannot be artificially induced after death. I maintained that there was proof that the weapon had never been fixed in a tight grasp by cadaveric spasm. For, had it ever been so clenched, the razor could only have come into the loose state found by me owing to one of two causes, viz. either by the fingers having been opened by some one, or by the subsidence of cadaveric spasm. That neither of these causes had come into play was clear from the fact that *rigor mortis* was still present and well marked in the fingers of the right hand, as elsewhere, at the time of my examination. Had the fingers been unclasped, by any person, from a grasp of the knife, cadaveric rigidity (*rigor mortis*) would have, to that extent, been destroyed so far as these fingers were concerned, and, once destroyed, could not have been restored. Yet I found it strongly present; the fingers were rigid and resisted flexion. The hand had, therefore, never been unclasped, and, therefore, can never have had a tight grasp of the razor fixed by cadaveric spasm.

It was suggested by the defence that a tight grasp of the razor may have been fixed by cadaveric spasm at the moment of death, but that a supervening stage of general relaxation may have loosened it, and this loosened stage have been found and fixed by supervening *rigor mortis*; and that this would explain the condition found. The answer is plain; that cadaveric spasm is *rigor mortis* (early in setting in), and that, when relaxation ensued, there would be no further (or second) *rigor mortis*. There were two other points indicating that the position of the fingers of

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the right hand had not been altered by any person, namely, that the position of the fingers of both hands was identical, finger for finger, joint for joint, and that the members of both hands were in the position commonly found in death from whatever cause, *i.e.* thumb close to palm, its last phalanx and the two lower ones of each finger semi-flexed. It would have been a remarkable coincidence if the right hand had, after having been opened, been recomposed into such identity of position with the left. The absence of a tight grasp on the razor is, however, no direct proof of homicide; it merely destroys *one* proof of suicide. For a razor may be found loosely held in the hand of a suicide owing to cadaveric spasm not having occurred, the weapon having continued to lie in the hand during the ordinary after-death stage of relaxation, and this relaxed state of the hand having become fixed by *rigor mortis* eventually. On the other hand, a razor put into the hand of deceased after death would have been found in precisely the condition in which I found the weapon in the present case. (For cases illustrating this, see Taylor, 3rd Edn., 1883, pp. 67 and 519; the Saville case, the Gardner case, also Tidy, Part I. pp. 121 *et seq.*).

IV.—Death almost instantaneous. This naturally follows from the whole of the large vessels and nerves of the neck having been severed. That death was not quite immediate is shown by the presence of blood-stained froth in the larynx, below its severance, and in the bronchi: deceased must have breathed after division of the trachea and blood-vessels.

V.—The wounds were inflicted during life. For the defence, it was argued that the wounds of the neck might have been inflicted *after death* from some other (natural) cause; and that wounds, caused immediately or soon after death, were not distinguishable with certainty from those inflicted during life, that therefore I was not warranted in giving a definite opinion that they were actually inflicted during life and were the cause of death. So far as the appearance merely of an incised wound is concerned, Taylor and Aston Key found that one inflicted within two or three minutes after death showed considerable resemblance to one inflicted during life. In the present case, however, the extreme retraction of the divided skin and muscles, and the free ecchymosis into margins of tissues bounding the wound, show this to have been inflicted during life. But it was not necessary to look to the wounds alone for evidence on this point; the amount of blood loss, every part of the body being drained of blood, even parts so remote from the wounds as the kidney, vagina, etc., the empty and contracted condition of the heart cavities, all confirmed the conclusion that the large vessels were opened by the wounds during life. Division of these vessels, after the heart had ceased beating, could not have emptied the body of blood to anything approaching the degree found in the present case.

VI.—Absence of cries and of signs of struggle. This was *primâ facie* evidence in favour of suicide. This absence can, on the other hand, be accounted for on the supposition that deceased was taken unawares and a disabling wound at once inflicted. There is much other evidence to support the theory that this really occurred. Ecchymosis might reasonably have been absent, even had deceased struggled, if restraint had been applied with the interposition of some soft medium, such as the prisoner's own clothes. If such a medium had been used over head and face, it would probably have been stained with jets of blood. It should be noted that the clothes which the prisoner is believed to have worn at the time of the alleged murder, were not forthcoming for examination. There may have been marks of jets of blood on them. I further

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expressed the opinion that even had (say) the face, mouth, hands, etc., been subjected to firm holding or compression, such as would ordinarily have left bruise marks, yet in the case of deceased, the hæmorrhage must have been (from the great size and numbers of the vessels divided) so rapid and copious, that it is quite conceivable that no blood would be left to effuse and ecchymose at the region compressed. Deceased was not drugged into helplessness; the stomach was found healthy, empty, and free from anything which could excite suspicion.

Points tending to fix the Crime on the Prisoner.—1. The period at which death of deceased occurred. 2. Could the wounds have been caused by the razor found in the right hand of deceased? 3. Were the wounds inflicted on the deceased while asleep? 4. *Rigor mortis*, as a test of the time dead.

1. Hour of death of deceased. This point was of the gravest importance to the prisoner; and, as such, the opinion expressed was subjected, by the defence, to prolonged and searching criticism. The following were the facts involved:—Deceased had taken a meal of *chupatties*, curry, and rice a little before retiring to rest at 10 P.M. with her husband (the prisoner); she was not again seen alive; prisoner left the house at 4 A.M.; deceased was found dead with her throat cut before he returned. The question to be determined was—did death occur during the period 10 P.M. to 4 A.M., during which the prisoner was in her room, or did it occur after his leaving the house? If the murder was not committed before his leaving the house, then the prisoner was not guilty. The degree to which digestion had advanced was the factor employed to determine whether or not death occurred between the hours mentioned. At the *post mortem* examination the stomach was found quite empty; food, thick and fluid, which had recently undergone gastric digestion, was present in the upper small intestines, duodenum, and jejunum. From the fact of this food being present in the duodenum, it was clear that the stomach had but quite recently become empty. The period of ingestion of the meal was known, and the nature of the food taken. The question remained—in how many hours would the gastric digestion of such a meal be completed and the stomach left empty? If this had taken more than six hours (*i.e.* from 10 P.M. to 4 A.M.), then deceased died after prisoner left the house, and during his absence. Dr. Beaumont (in experiments on Alexis St. Martin) found that rice was digested in one hour; barley, milk, fish, in two hours. He refers to gastric digestion. His conclusions have never been disputed by any authority (see Appendix V. for details, also for Indian observations). Other authorities have given periods of from 2½ to 5 hours as those required for the stomach to become empty after an ordinary meal (McKendrick, Pavy, M. Foster, Todd and Bowman, Carpenter, etc.). By an ordinary meal they mean an ordinary European meal consisting of meat, vegetables, bread, etc. Meat and other highly nitrogenized foods take longer to undergo gastric digestion than such starchy foods as rice, wheat, etc. For a meal of rice and *chupatties*, then, a shorter time must be allowed for gastric digestion. Sleep retards digestion, though it is impossible to express this retardation definitely in hours. Digestion is more active in the young. Deceased was 11 years of age, and was, presumably, asleep during all, or some part of, the time she was in bed, between 10 P.M. and 4 A.M. It will be seen that it was not possible to state, in hours, the exact time occupied in digesting her last meal; so many modifying circumstances, including those above noted, being present. Taking everything into account, I gave the opinion that the period required to bring her last

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meal into the condition found on *post mortem* examination would be at the outside, 6 hours—more probably some hours less. Dr. K. McLeod, speaking as medical expert, gave the period as from 3 to 6 hours—nearer the former than latter. The death was thus shown to have occurred before the prisoner left the house—in all probability.

2. Could the razor found in the hand of deceased have been the weapon with which the wounds were inflicted? I held that it could. The question was raised by the defence, in the interest of the prisoner; the razor having been proved to be the property of the prisoner. To have caused the clean-cut, even, upper margin of the first and great incision, the razor must at that time have been sharp edged. The soft tissues in front of spine must necessarily have been divided before the razor could have cut the bone of the spine and have thereby become notched. The edge would, therefore, have remained uninjured during the incision through the tissues of the left side of neck; the part of the razor—the point—which penetrated to the spine may then have become notched on its edge, but the remaining part of the incision through the tissues in front of spine (*i.e.* on right side of neck) would be made (even and clean-cut) by the heel of the razor which, being less deep in the wound, would impinge on the less deep tissues, and which would not have engaged the deep-lying spinal bones, and so not have lost its keen edge. The second and third wounds scarcely touched the tissues of the neck; they fell almost immediately, through the gaping first wound, on to the spine; so that the whole length of razor probably impinged on the bone, and became notched on its fine edge. Could a sharp razor have had its edge turned, and finally notched (as was that found in hand of deceased) by contact with the bones of the spine (these three wounds of spine)? It probably could. On this point, see case of Earl of Essex (Taylor, 3rd Edn., 1883, Vol. I. p. 519); in discussing which, Taylor does not dispute the fact that the edge of a sharp razor could be notched by wounding the bones of the spine—he merely affirms that deceased could not have himself done this.

3. Was deceased murdered while asleep? There are a number of reasons for thinking so:—(1) The placid appearance of the face was eminently consistent with the taking of life during sleep. (2) The characters of the wound of neck. Its crescentic shape, the ends being $1\frac{1}{2}$ inches higher than the middle, its plane being sharply upwards, points to the great wound having been inflicted from behind while deceased was lying on her back; its clean-cut regular margin points to it having been caused by a steady stroke while deceased was quiet and unresisting, probably asleep. (See case *Lord W. Russell*, *Reg.* v. *Courvoisier*, Taylor, 3rd Ed., p. 513.) (3) The direction taken by the effused blood, shows her to have been lying on her back when the great wound was inflicted, and to have been so disabled by it as to have not moved afterwards. (4) The absence of marks of a struggle, although deceased was not drugged nor apparently forcibly held.

4. *Rigor mortis* as test of time dead. The defence made an attempt to fix the death by this means at a period subsequent to the prisoner having left the house, and thus to clear him of the murder. As the body after death had to cool through one degree of temperature only the existence of *rigor mortem* at the time of the *post mortem* examination was in keeping with death occurring before prisoner left the house. The accused was convicted and sentenced to death.

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Results Following, or Likely to Follow, the Injury?

The reply to this question must be cautiously given, as the result of injuries, whether disabling, mortal, or otherwise, depends on a variety of circumstances, especially on: (1) the part injured; (2) the nature and extent of injury; (3) the state of health and age of the injured individual.

Where death has not occurred the questions will be:—"Is the wound dangerous to life?" or "Is it likely to leave permanent injury or incapacity?" The former question can be answered from the details already given with reference to the particular part injured. Secondary dangers are, secondary hæmorrhage, tetanus, septicæmia, and erysipelas. The second question is more likely to arise in civil cases claiming compensation for loss of wage-earning capacity than in criminal, where the intent to injure is the chief factor in awarding punishment. This would be answered on general principles. The question of whether nervous shock is temporary or permanent is the most difficult to answer. '*Grievous hurt*' may sometimes follow, secondarily, as an indirect consequence of an injury, when inflammatory action leads to a stiff joint, loss of hearing, etc., etc.

Where death has followed the injury, it is necessary to satisfy yourself that all the organs are healthy before you can ascribe the death entirely to the wound or other injury.

Causes of Death, etc., in Wounds and Mortal Injuries.

Some injuries causing death may be called "conditionally mortal" injuries, *i.e.* such as cause death owing to either (1) Disease or infirmity, under which the injured individual labours, *e.g.* an enlarged spleen; or (2) The supervention of disease, *e.g.* tetanus, septicæmia, erysipelas; or (3) Want of resort to proper remedies or treatment, as when death occurs owing to loss of blood from a wounded artery of moderate size, such as the brachial. Others may be called 'mortal' injuries, or injuries intrinsically sufficient to cause death, irrespective of the existence of any conditions such as those above mentioned.

Death from a mortal injury may occur by: (1) Coma, *e.g.* from pressure on the brain of fragments of bone or effused blood; (2) Asphyxia, *e.g.* from paralysis of the movements of respiration, or mechanical interference with this process; (3) Syncope from loss of blood, or from mechanical impediment to the heart's action; or (4) Shock, as in death from concussion of the brain, or from the effects of a violent blow over the region of the solar plexus.

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In some cases, difficulty may be experienced in tracing the connection between death and an injury proved or alleged to have been received; thus, in the case of injuries alleged to have been caused by the action of external violence on a diseased organ, it may be difficult to determine whether the injury to the organ in question was or was not the result of external violence. In cases of this class, much will depend on (*a*) the liability or otherwise of the affected part to rupture from causes other than externally applied violence (see 'Rupture of the Spleen,' 'Injuries to the Brain,' etc.); and (*b*) the presence or absence of marks of violence on the surface of the body over the injured part, or in the tissues situated between it and the surface of the body.

Case.—**Assault not homicide** in rupture of enlarged *spleen.*—*Reg.* v. *Bysagoo Noshyo.*—Accused quarrelled with his wife and gave her a kick, which ruptured her spleen. He repented immediately and was found with the woman in his arms helping her. Acquitted under *ss.* 320 and 322 of Penal Code, but found guilty under *ss.* 319 and 321. Sentence: One year's rigorous imprisonment.—8 *W.R.*, Cr. 27.

Case.—*Reg.* v. *Robert Bruce.*—Accused was tried for 'causing hurt' by kicking a boy who was suffering from diseased spleen. Death was the result of the kick. The judge held that the prisoner had no intention of causing death, but, considering the dangerous consequences of such an act, especially when inflicted on a native in this country, sentenced him to six months' rigorous imprisonment.—*Calcutta Criminal Court*, June, 1868.

When a conditionally mortal injury is alleged to have caused death owing to the supervention of disease, it may in some cases be very difficult to decide whether or not the disease is really to be attributed to the injury.

In England the law seems different, for, according to Lord Hale, "if a man be wounded and the wound, although not in itself mortal, turn to gangrene or fever, this is homicide in the aggressor; but though the fever or gangrene be the immediate cause of death, yet the wound, being the cause of the gangrene or fever, is held the cause of death—*causa causati*. It is sufficient to constitute murder that the party dies of the wound given by the prisoner, although the wound was not originally mortal but became so in consequence of negligence or unskilful treatment." "If a man," says Lord Hale, "has a disease which, in all likelihood, would terminate his life in a short time, and another gives him such a blow as hastens his death, this is such a killing as constitutes murder." Disease of the spleen, however, is not even a disease which need necessarily prove fatal.

Mortal injuries causing death by coma, asphyxia, or hæmorrhage leading directly or indirectly to syncope, are not likely to present difficulties of the kind just alluded to. In some cases, however, of death from shock, it is possible that it may be very difficult to trace the connection between death and the alleged violence. With reference to this, it may be pointed out that death from shock may occur: (1) without any mark

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of violence being present—this has been often observed in cases where the fatal shock has been due to a violent blow over the region of the solar plexus; or (2) a single slight bruise only may be present as in many reported cases of fatal concussion of the brain; or (3), as often occurs in cases where persons have been severely beaten, from the combined effect of a number of slight injuries, each by itself totally insufficient to account for death. In cases such as these, it is especially important that the *post mortem* examination should be complete, as much may depend on the medical officer being able to state (if it be so) that no appearances were present indicative of a cause of death, other than the alleged violence.

Examination of Stained Articles, Blood-Stains, Seminal, and other Stains.

Stained weapons, clothes, bits of furniture, plaster, mud, etc., may be sent for examination in cases of alleged wounds, rape, and unnatural crime. These stained articles are usually passed on by civil surgeons, for want of the requisite apparatus and test materials, to the chemical examiner for his expert report. In sending such articles the same strict precautions as to labelling, sealing, etc., must be taken as in poisoning-cases (*q.v.*).

Preliminary Examination of Stains.

1. **Note** down carefully an exact description of the stained articles, weapons, etc., submitted to you for examination, to enable you afterwards to identify the articles, as the whole case may break down if you cannot identify in court the article from which you have examined the stain. Note the number, shape, size, colour, consistency of stains, on what part of weapon and on which side of the garment, the inside or outside; and if more than one garment stained, whether they are stained in a corresponding part. In important cases a *photograph* should be taken of the stained garment or article before removing any of the stain.

2. **Cut out part** of the suspected stain from the article, and divide each part into at least three portions for tests and control purposes, and carefully preserve as much as possible of the original stain for exhibit afterwards in court.

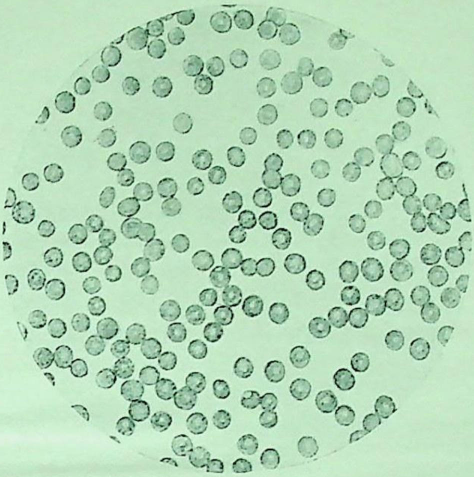
Authority to cut out portions of the exhibits must be first obtained from the magistrate of the place whence the stain is received.—See Form in Appendix IV.

These stains may consist of (1) blood (see p. 171), (2) semen (p. 297), or (3) other matter; such as brain substance, which may be detected microscopically by its anatomical structure.

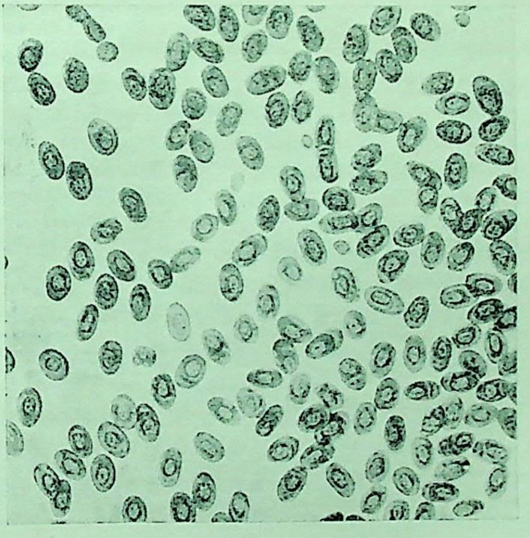
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PLATE IV.

a



b



a.—Human Blood Corpuscles × 400.

b.—Amphibian Blood Corpuscles × 200.

(From Micro-Photographs by Dr. H. Gibbes.)

[*To face p.* 170.

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CHAPTER VI.

BLOOD-STAINS.

[By Lt.-Col. W. D. Sutherland, M.D., I.M.S.]

Appearance.—When a blood-stain comes to be examined, its colour may be anything from blackish through reddish-brown to a dirty grey—very unlike the colour of freshly-shed blood, with which we are all familiar. The colour of the stain depends greatly upon the exposure to light and air that it has undergone. In some cases the efforts of the accused person to get rid of the evidence of his guilt may leave very little trace of the presence of what had been a large blood-stain.

On a hard surface, such as glass or iron, the stain may resemble dark-red wax in parts. If it be the blood of a bird that has caused the stain, the waxy appearance is uniform and highly characteristic. On earth, or plaster, the stain will be dull of surface and dark-brown or greyish-brown in colour.

If the stained fabric be dark in colour, the stains may be hard to detect when examined by daylight. In such a case it is of service to examine the fabric through an eosin-film, as suggested by Popp, or by artificial light, candle-light being the most satisfactory, I think, the rays being allowed to fall obliquely on the fabric.

Often bamboo staves are sent by the Courts for examination, as to the origin of suspicious-looking stains on them. Though the bamboo staff is a very favourite weapon of offence in India, yet it is in only a few cases that the stains on it are found to be due to blood. As a rule they are due to the saliva ejected during the process of betel-chewing, and mimic the appearance of true blood-stains very well indeed; but on further examination of the stain under the microscope their origin is easily enough detected.

I would insist upon the rare occurrence of blood-stains on bamboo staves, although, as we all know, lacerated wounds of the scalp, which at first sight are not unlike cuts made with a

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sharp instrument, are common results of blows delivered by means of a bamboo staff.

On the blade of a knife, hatchet, or sword we may often find that what the police have suspected to be blood-stains are really due to rust. On a well-kept knife blood-stains are rarely to be found: in several cases a sacrificial knife has been found free from bloodstains, although it had been in constant ritual use for a long time, and had tracery on its blade, in the crevices of which blood would easily have collected, had it not been kept scrupulously clean. The blood on a knife, if any be present, will generally be found at the junction of the blade with the handle of the knife, or—in the case of a pocket-knife—in the nick in the blade by which it may be raised by the thumb-nail.

Examination of stain.—In order to be in a position to determine whether a suspected blood-stain is really due to blood, we require:—(1) a clean sharp knife; (2) a pair of scissors; (3) some 10 per cent. solution of potassium cyanide; (4) some *yellow* sulphide of ammonium solution;[1] (5) a microscope with a $\frac{1}{2}$ inch, a $\frac{1}{6}$ inch, and a $\frac{1}{12}$ inch oil immersion lens; (6) a Zeiss' modification of Browning's pocket-spectroscope, with—this is indispensable—a wave-length scale.

If the stain be on a hard surface, a portion of it may be moistened with the potassium cyanide solution, scraped off and smeared on a microscopic slide. If it be a soft fabric that is stained, a portion of the stain may be snipped off, immersed in boiling water for three seconds to fix the colouring matter by coagulation, placed on the microscope slide and treated with a drop or two of the potassium cyanide solution, the superfluous fluid being removed at each stage of the process.

To the stains thus treated, there are then applied a few drops of ammonium sulphide solution. The preparation is then covered with a cover-glass, the superfluous fluid is mopped up by a fresh morsel of bibulous paper, and the preparation examined under a low power. If blood be present, at some spot in the preparation we shall see a cherry-red colour. If the coloured part be very small, we bring it into focus under a high power, and then, having removed the eye-piece, insert into the microscope-tube the long tube of the spectroscope. The absorption band or bands visible in the spectrum may now be fixed as to their position on the scale by the simple device of holding a piece of white paper below the end of the short tube of the spectroscope, to illuminate the scale well.

[1] Saturate a 1 : 4 solution of ammonia with hydrogen sulphide and then add an equal volume of ammonia solution, the resultant being $(NH_4)HS$ in solution, which must be kept in a stoppered bottle.

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If blood pigment be present, it will have been converted into **cyanhaemochromogen,** whose spectrum gives a dark band at λ570–550 and a darkish band at λ540–525; the latter,

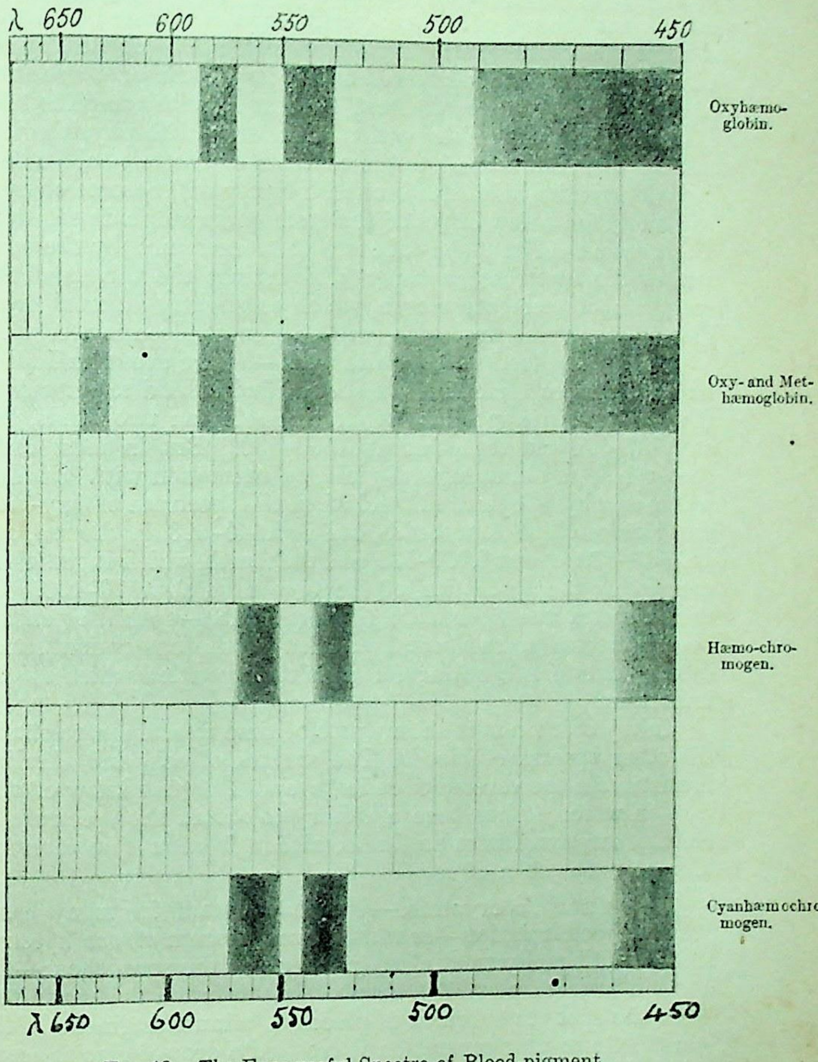


FIG. 13.—The Four useful Spectra of Blood-pigment.

however, if the dilution be high, may be so faint as to be almost or quite invisible.

No other known substance when treated as above described

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gives the cherry-red colour *and* the spectrum of cyanhæmochromogen. Hence the value of this method of examination, whose technique has been elaborated by Hankin. The test is a most delicate one and should always be employed. Thus carried out the use of a microspectroscope is obviated, and this is a great advantage, as all who have ever used one will agree. If, as sometimes happens, we have a large stain or a quantity of earth available for the test, then it may be simplified by extracting a considerable portion of the stain with physiological salt solution, and adding to the contents of the test-tube a few drops of pyridin, when the brownish liquid will become cherry-red, and then a few drops of the ammonium sulphide solution. The contents of the test-tube are then examined by the long arm of the spectroscope being held against the tube, and the spectrum of hæmochromogen, which is slightly different from that of cyanhæmochromogen, will be seen, if blood is present.

Were the blood-stains quite fresh—a rare event in Indian forensic medical practice—we should find it hard to get rid of the characteristic spectrum of oxyhæmoglobin: two bands, one at λ587–570 and the other at λ550–530. But in most cases the stains are old enough to yield, on extraction with distilled water or physiological salt solution, the spectrum of oxy- and met-hæmoglobin: four bands, one at λ640–628 in the red, one at λ587–570, one at λ550–530, and the fourth, which is generally merged in the absorption of the blue rays, at λ510–490. Of these spectra the figures are given (Fig. 13)—special attention being directed to the actual position of the absorption bands in the wave-length scale; for it is their position which is all-important.

In my opinion it is sheer waste of time to attempt to obtain the other spectra of blood. The spectra of acid and alkaline hæmatin are the reverse of delicate, and I do not know of any case in which it has been necessary to obtain the spectrum of hæmatoporphyrin here in India, although in a few cases in Europe it has been of use.

Teichmann's crystals.—We may obtain in many cases valuable confirmation—or rather corroboration of our spectroscopic findings by treating a fragment of the stain thus:—On a clean microscope slide a drop of salt solution is evaporated. Near the spot thus formed is placed a minute fragment of the stain. On to the preparation is dropped a drop of glacial acetic acid. The preparation is then covered and warmed in the Bunsen or spirit flame until bubbles appear. It is then laid aside and examined after half an hour. Under the low power of the microscope we shall find a multitude of dark specks, which under the high power will be found to be the various

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forms of the crystals of hæmatin chloride. Of these an excellent representation is given in the illustration, which I owe to Major W. H. Dickinson, I.M.S., who drew the illustration from a specimen made in actual practice. The slower the generation of the crystals the more numerous will be their ultimate form—the rhombs, and the larger these will be.

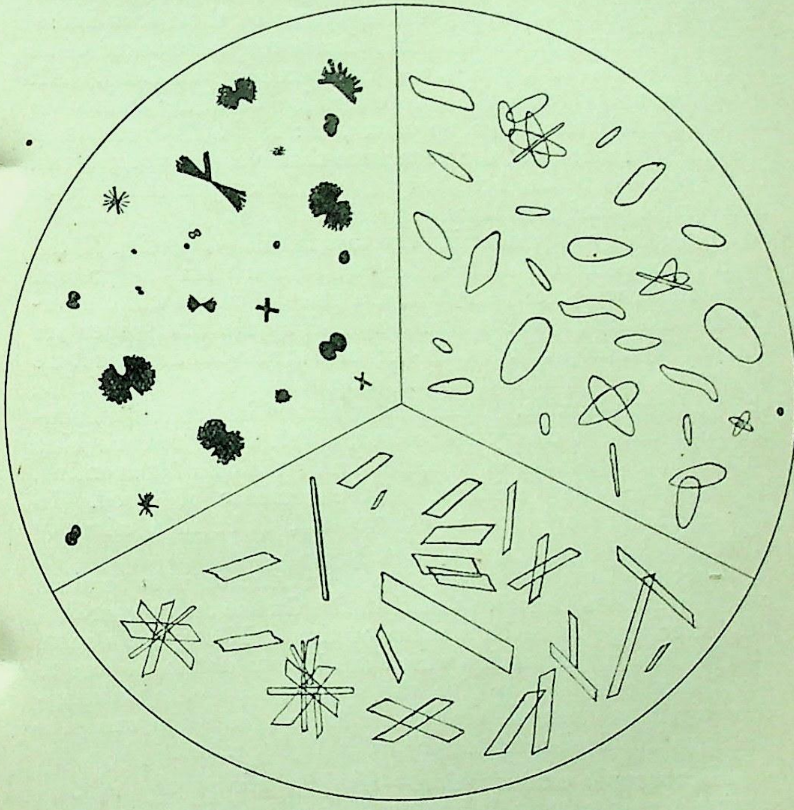


FIG. 14.—Hæmatin Chloride Crystals.

(Drawn by Major W. H. Dickinson, I.M.S., from a specimen obtained in actual practice.)

The preparation must be only gently heated, and the acid must be glacial. But even when these conditions are fulfilled and blood is really present we may fail to obtain the crystals owing to changes having been brought about in the blood by exposure or rust, or both.

As crystals like those of hæmatin chloride may be obtained

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from indigo-dyed fabrics, it is well to remember that the crystals of hæmatin chloride will cause frothing of a drop of hydrogen peroxide, whereas the others will not, as was first pointed out by Glaister.

Guaiac test.—I mention another test, not because I use it—my reasons for rejecting it have been detailed elsewhere—but because it was highly praised by Taylor, whose monumental work is looked upon with great reverence by the Bar in India, and it is likely that the medical witness might be asked if he had applied this test, which was discovered by van Deen. All who now use it, with the sole exception of Mita,[1] do not do more than rely on it as a negative test: if they do not obtain the characteristic blue, they conclude that blood is not present. If they do obtain the blue, they do *not* look upon this fact as irrefragable proof that blood is present.

A good way of performing the test is this—a portion of the stain is moistened with distilled water, and then has pressed down on it, with gentle rubbing, a piece of moist white filter-paper. To the brownish stain acquired by the filter-paper are applied (1) a drop of a freshly-prepared straw-coloured tincture of guaiac resin, and then (2) a drop of old oil of turpentine, or hydrogen peroxide. Mita states that if he obtains on adding the guaiac a cherry-red colour, which turns to dark blue within half a minute of the addition of the oil of turpentine, he has satisfactory evidence of the presence of blood. In this opinion he appears, as I have said, to be in a minority of one.

Since the hæmochromogen test is so delicate as to be more useful even as a negative test than the Guaiac test, to perform the latter appears to be a waste of time. If any one doubts this let him try the stains which are known *not* to be due to blood having failed to give the spectroscope of cyanhæmochromogen, and he will find that a large percentage will give the so-called blood-reaction, on which Taylor relied.

Microscopic examination.—Having arrived at the conclusion that the stain before us is really due to blood, we proceed to determine whether this has come from a mammal or a non-mammal thus:—A minute fragment of the stain is left to soak in two drops of Vibert's fluid—½ gramme mercuric chloride and 2 grammes of common salt in 100 c.c. of distilled water—for half an hour. It is then teased out and examined. Under the low power one of the yellowish-red masses, due to agglomeration of erythrocytes, is brought into the centre of the field. The more or less amorphous débris, and the fibres of

[1] Gross' *Archiv.* 1909, 35, 361.

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the material stained do not interest us. Under the high power the mass will reveal the erythrocytes, of which it is composed, and at its periphery the general shape of these can usually be fixed, as also the presence or absence of nuclei. Near the edge of the mass may often be found a group of four or five erythrocytes, and with luck one may find a solitary erythrocyte.

If bird's or fish's blood be present we shall rarely find the erythrocytes entire. In the great majority of cases all that we shall see will be a mass of granular elliptical nuclei. These must be carefully examined in order to determine that they are nuclei and not misshapen circular erythrocytes that have undergone granular degeneration. If we find elliptical erythrocytes with elliptical nuclei the diagnosis of non-mammalian blood is very easy; but such cases are unfortunately not common.

If mammalian blood be present we shall find circular erythrocytes more or less altered in shape, and perhaps granular. But nuclei will be very rarely present, for it is only very few *very young* mammalian erythrocytes that are nucleated, and it is very rarely that one of these is seen amidst the thousands of

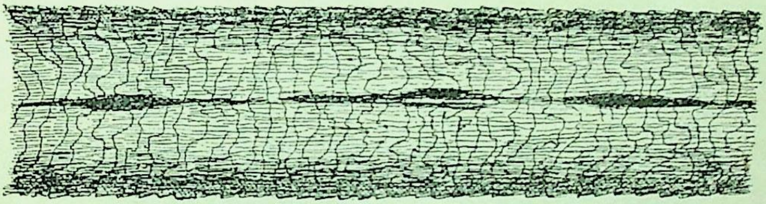


FIG. 15.—Human Hair.

(By W. H. Dickinson.)

Light brown hair from head. The darker the hair, the greater the amount of pigment, and the less structure seen.

non-nucleated corpuscles that are found in a single preparation. The erythrocytes of the camel are elliptical, and *might* be mistaken for the nuclei of non-mammalian erythrocytes; but here the biochemical test would clear up the difficulty, if any.

Only practice will enable the observer to come to a decision after examining one or two blood-masses under the oil-immersion lens. The beautifully marked differences seen in fresh preparations of mammalian and non-mammalian blood are not present in preparations made from old blood-stains.

I do not think that one gains much by using a micrometer —stage- or eye-piece. It is not the size of the erythrocytes seen that matters so much as their general shape and the

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presence or absence of nuclei. It is quite useless to attempt to determine by means of micrometry, the origin of mammalian erythrocytes. Even in the case of fresh blood the determination is not sufficiently accurate to be of much use in forensic medicine. The coefficient of drying of erythrocytes has not yet been, nor is it likely to be, determined; still less the degree of return to their original size as the result of treatment with any of the various fluids that have been devised for treating preparations of blood-stains. Thus we can never be certain that the erythrocytes from a stain have regained their exact size when fresh, neither more nor less. Reference to any table—or

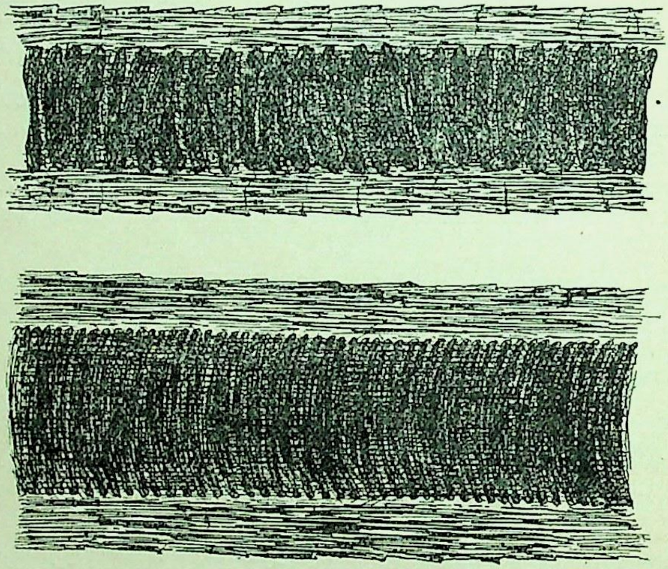


FIG. 16.—Cat's Hair.
(By W. H. Dickinson.)

to my monograph—will show that even in the case of fresh blood the erythrocytes of various species of mammals differ very little from those of man, and that this is true only of average specimens: the individual specimens of any one species may differ more in size from each other than the average specimens of that species from the average specimens of another species.

At the end of this chapter I have collected a few cases, which illustrate the aid given by the microscope in Indian forensic medicine.

In some cases we shall find hairs in the stain, and these

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may be of service to us. The determination of the source of a hair is not easy, but Major Dickinson, who has made a special study of hairs, has kindly drawn several from nature. Micro-photography would not have brought out the characteristics of each type so clearly as do these admirable drawings, for which I am deeply indebted to him.

Biochemical tests.—These are of recent growth, but are none the less trustworthy, and by them we are enabled to determine the origin of a blood-stain with accuracy.

The Precipitin test can always be carried out here in Calcutta in a well-equipped laboratory by a skilled observer. In order to understand it we must remember that the living organism has the power of manufacturing antibodies for any albuminous material that may be introduced into it. These antibodies exist in the blood of the animal that has been treated, and the blood or its watery portion—the serum—can be stored for use. If we take a dilute solution of the albuminous material in question and to this very carefully add a few drops of the serum of the animal that has been treated with it we shall find a reaction take place: at the point of contact of the animal's serum with the albuminous solution there will come into being a cloudy layer. This is due to the precipitation of the albuminous particles by the precipitins contained in the treated animal's serum. The reaction will not occur if the serum be added to a solution of an albuminous material other than that with which the animal was treated. In other words, the reaction is a specific one. It is also a very delicate one, for even if the solution of albuminous material be of only one part in a thousand it will readily become evident.

For forensic medical practice the observer must have at hand the serum of animals—fowls are as good as any—that have been treated each with the blood of one of the domestic animals—dog, cat, horse, buffalo, pig—and a large quantity of the serum of fowls treated with the blood of man. For *the* question which he will have to answer is: Is this stain due to human blood?

From the domestic animals the blood is obtained by venesection; in the case of man it is most conveniently obtained from the placenta, after the umbilical cord has been cut. The blood is collected with great care, to avoid all chance of contamination, and kept in sterile flasks in which it is allowed to clot. As the clot shrinks the serum exudes, and next day this is decanted and heated to 56° C. for half an hour. It is then stored in sterile phials, corked and sealed with paraffin, which are kept in the freezing chamber until they are needed.

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The fowl's wing is carefully purified on the inner surface by being swabbed with pledgets of cotton-wool soaked in ether —and then the serum (thawed and brought up to 37° C. or a little higher) is injected into the wing vein. The dose is

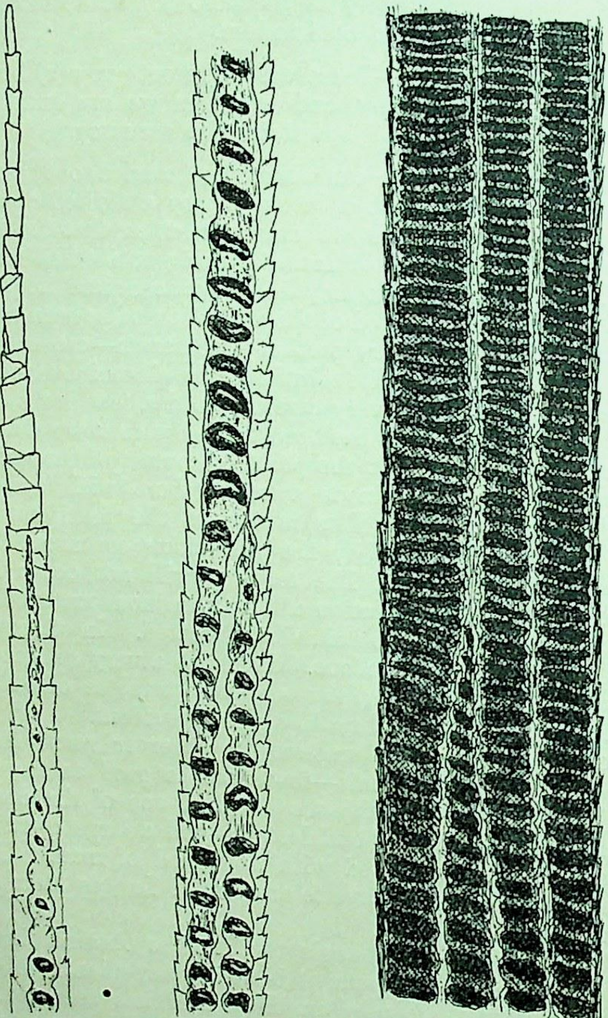


FIG. 17.—Rabbit's Hair.
(By W. H. Dickinson.)

usually 4 c.c. On the fourth day a second injection is made, the other wing being used. Fourteen days after the second injection the fowl is bled. Its blood is collected as above

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described, and next day the serum is tested as to its precipitating power and specific action thus:—

The sera of the domestic animals and of man are diluted a thousandfold with physiological salt solution. In a stand are placed six taper tubes—and into these are put the 1:1000 dilutions of serum, the last tube receiving only salt solution. Then each tube has its contents allowed to run nearly out of it, to wet its inner surface well. It is then held in a slanting position, and down its side are allowed to run two drops of the treated fowl's serum—which may conveniently be called the antiserum.

Supposing that the fowl had been treated with human serum, then if the antiserum derived from it be specific and highly potent we shall within three minutes observe a marked reaction in the tube containing the 1:1000 dilution of human serum, but in no other tube will any reaction be visible even after the lapse of twenty minutes. This antiserum is stored for use, and every time that it is used for testing blood-stains its specificity and high potency are tested again, in the way above described, so that the observer may be sure at the time of testing the blood-stains that his antiserum fulfils the desiderata of the forensic test: for sometimes potency and specificity become altered by keeping. The accompanying plate shows the reaction in one tube and its absence in all the others.

The number of treated fowls that yield a good antiserum is fairly large—over 50 per cent. Many are refractory, and many yield a serum that is weak, and therefore useless for medico-legal work.

When the observer desires to determine the origin of a blood-stain he makes an extract of it, by soaking the stained fabric or scrapings of the stain in physiological salt solution. Some stains are hard to extract, and for these the addition of a few drops of solution of potassium cyanide to the salt solution in which they are immersed is a good plan. The stain extract is then tested as to its alkalinity or acidity. If it be acid it must be rendered neutral or slightly alkaline by the addition of a drop or two of a weak solution of caustic soda, or potassium cyanide. If it be strongly alkaline, as it will be if the cyanide solution has been used to hasten extraction, it must be rendered only slightly alkaline by the addition of a drop or two of a solution of tartaric acid.

The extract having been thus treated is diluted with salt solution until it corresponds to a 1:1000 dilution of serum. The guide is the amount and persistence of the froth formed on gentle shaking. A little practice enables the observer to

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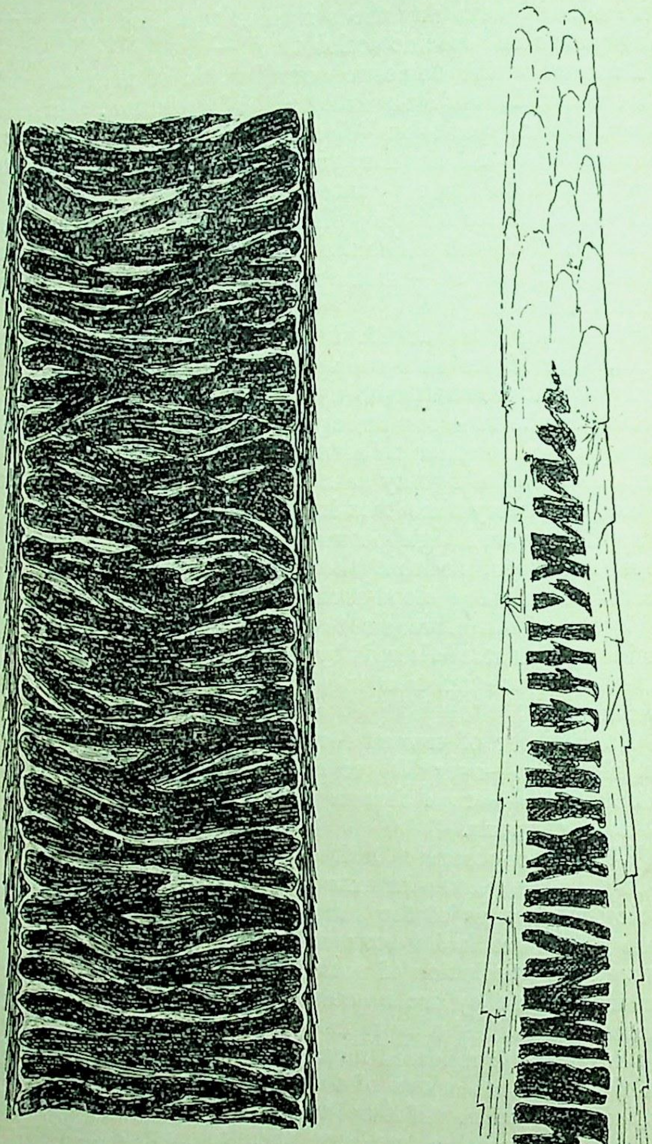


FIG. 18.—Guinea-pig's Hair.

(By W. H. Dickinson.)

obtain the necessary dilution of the extract with surprising accuracy. The dilution is carried out in order that the test

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may be as delicate as possible. If anti-human serum be added to, say, pure horse serum or a 10-fold dilution thereof we shall have a reaction—the mammalian reaction, as Nuttall first called it—but if the horse serum be diluted to 1 : 500 no such reaction will occur within 20 minutes—and it is still less likely to occur if the dilution be 1 : 1000.

Dilute, water-clear[1] extracts of all the stains that have been proved to be due to blood having been made, these are set out in taper-tubes. To the contents of each tube the observer adds two drops of an anti-human serum, which he has already tested on the morning of that day, and found to be highly-potent and specific in reaction. When testing it, he has guarded against too rapid thawing, which interferes very much with the specificity of reaction, for the physical attributes of the serum are obtained in their entirety only by very slow thawing. The tubes whose contents show reaction within twenty minutes are noted. The stains whose extracts are in these tubes are proved to be due to human blood. *Monkey's* blood has been only once alleged to have caused the stains found on articles examined by me; but, as I have shown elsewhere,[2] even those apes that are most nearly related to man are sufficiently far removed from man for their blood to be differentiated from his by the 20 minutes' time-limit of the reaction. Other portions of the extracts which have shown no reaction with the anti-human serum are now tested with an anti-ruminant serum. Should any stain-extract still show no reaction, a fresh portion of it is tested with anti-canine, anti-equine, etc., serum until the whole gamut of the domestic animals has been gone through. Of course, should the police have reported that it is suspected that the blood of, say, a cat has been smeared on the articles sent for examination, the anti-feline serum is the first that is used after the anti-human serum. I may note that in those cases in which the police had reason to suspect that what was alleged to be human blood had an origin other than human, their suspicion was generally found to be well-grounded. The wiles of those who desire to get their enemies punished, or to escape from the consequences of their own acts, are many, but the police seem to be quite able to cope with them. From the large amount of material that has passed through my hands, I am convinced that the work of the police in grave criminal cases is far more honest

[1] The extracts will not be quite clear in the case of blood-stained earths, and in some cases the dilution is much higher than 1 : 1000, because the quantity of albuminous material in the stain is so minute.

[2] SUTHERLAND: "The Applicability to Medico-legal Practice in India of the Biochemical Tests for the Origin of Blood-stains." Calcutta, 1910. (*Scientific Memoirs.* New Series. No. 39.)

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than certain of the lower organs of the press here care to admit. Why I am so convinced will be clear to all unprejudiced readers of the details of the examination of articles given below.

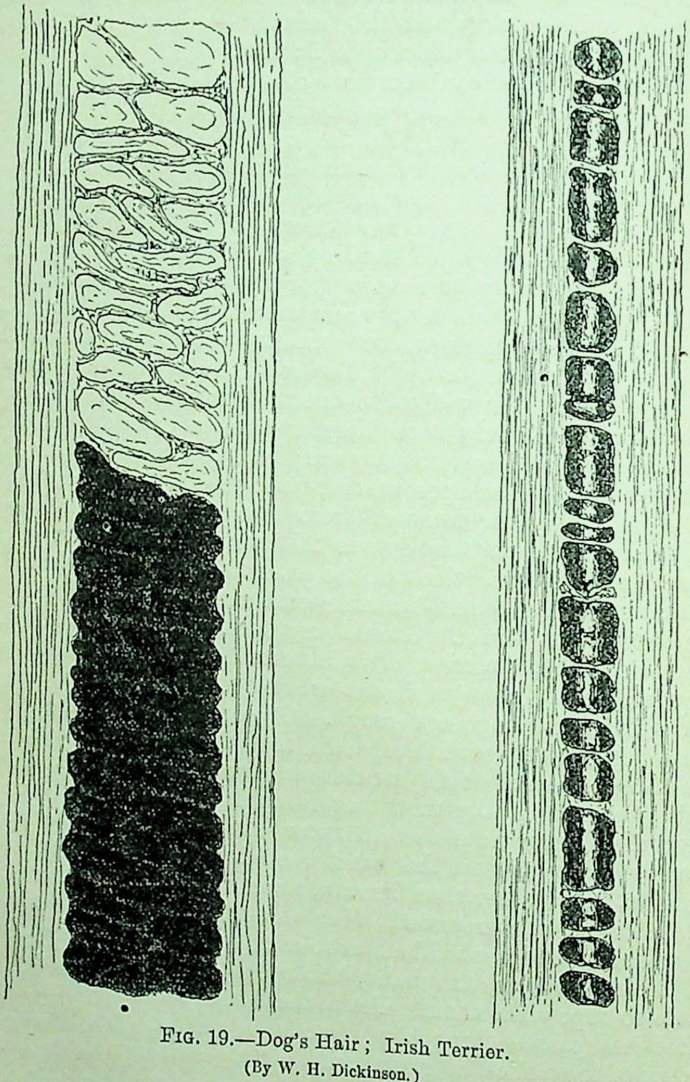


FIG. 19.—Dog's Hair; Irish Terrier.
(By W. H. Dickinson.)

If a blood-stain has been washed it will usually be impossible to say more than that it is due to mammalian or non-mammalian blood. If it has been well washed all that can be said is that it is due to blood, whose elements are too

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disintegrated for its source to be determined. Failure to obtain a reaction with the extract of a blood-stain may be due to any of the following causes: (*a*) The extract when diluted to the 1:1000 standard may be incapable of reacting with the anti-serum, owing to the paucity of albuminous material that is present. Such a result *may* occur in the case of microscopically visible stains; but, in my experience, does not occur where the stain is plainly visible to the naked eye, and has not been interfered with by any of the substances noted hereunder. (*b*) The extract, if markedly acid, will not react until it has been rendered nearly neutral. (*c*) If mercuric chloride be present, one part in 10,000, or permanganate of potassium be present in even smaller amount, the reaction will not occur. (*d*) Chloride of lime, sulphate of copper, sulphate of iron, chloride of zinc and bisulphide of sodium have all an adverse influence on the reaction. Fortunately none of these compounds is commonly met with in forensic medical practice here; but the observer must bear in mind that any of them may be present, and interfere with the reaction. Naturally, if a stain-extract, that froths when diluted to 1:1000, and is neutral or slightly alkaline, fails to react with the anti-human serum, it is no use asserting that it is thereby "not proved to be due to human blood," or assuming that it is contaminated by any of the above-mentioned compounds, if it gives a reaction with, say, anti-ovine serum, showing thereby that the physical characters of its elements have not been interfered with; or *vice versâ*. Putrefaction of the stains does *not* influence the reaction. This is fortunate, for sometimes blood-soaked garments are so carelessly packed that, before it dries, the blood undergoes a marked change. The age of the stain does not matter. I have obtained the characteristic reaction from extracts of stains that had lain in Calcutta for over four years, and it is not likely that stains of greater age than this would fall to be examined.

Here in India one is frequently called upon to examine earth that has been dug up from the floor of a dwelling, or from a courtyard, or a field, with a view to ascertain whether the stains on it are due to human blood. Having determined that blood is present, the observer might be at a loss to discover its source, owing to the fact that his best endeavours to obtain a clear extract fail miserably. The diluted extract remains turbid on account of the particles of clay or humus that remain in suspension, in spite of repeated filtration and centrifugalization.

With such an extract the test, if carried out in the ordinary way by daylight—by inspection of the contents of the tube

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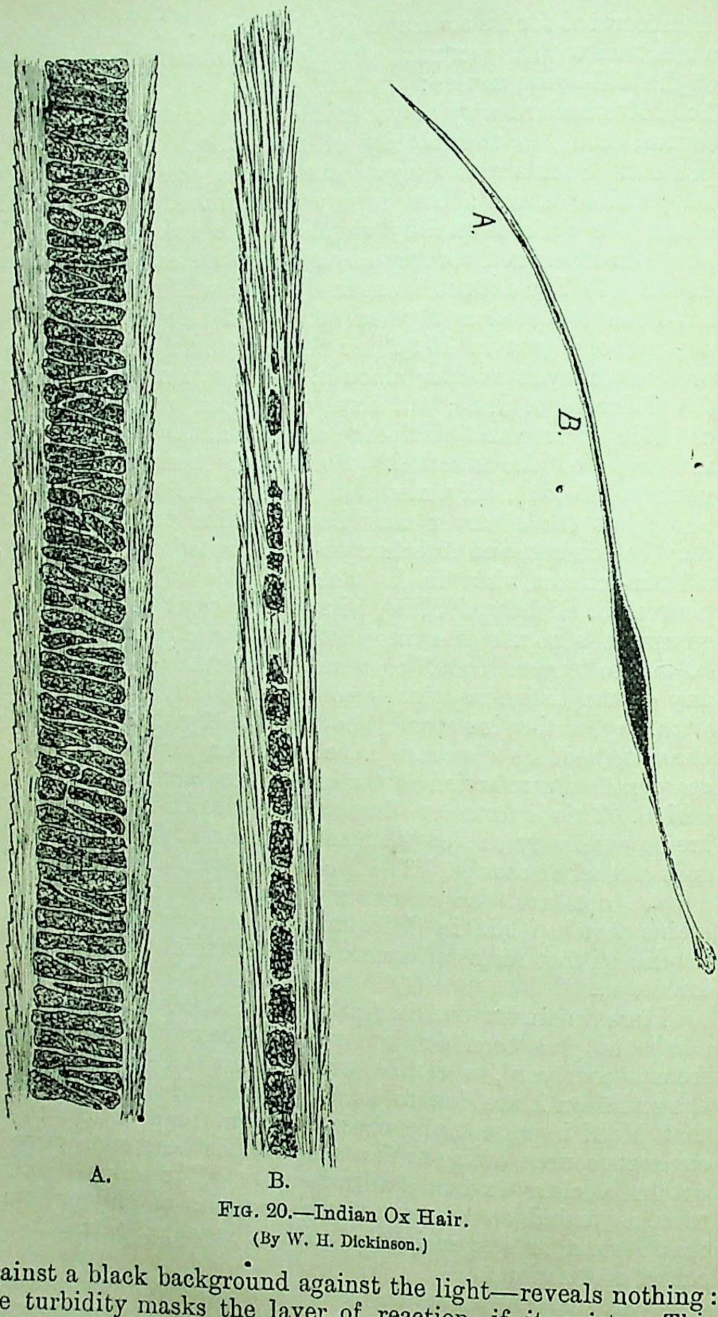


FIG. 20.—Indian Ox Hair.
(By W. H. Dickinson.)

against a black background against the light—reveals nothing: the turbidity masks the layer of reaction, if it exists. This

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difficulty may, I find, be surmounted by a very easy manœuvre. Instead of viewing the tube-contents against the light, they should be viewed against the black background held nearly *at right angles* to the light. When so viewed the turbidity of the extract-dilution, which was so marked when this was viewed against the light, will be found to have disappeared, while the layer of reaction, if present, remains clearly visible.

If we add anti-goat serum to dilute extracts of stains caused by ox, buffalo, goat or sheep bloods, all will react in a greater or less degree: for the ruminants are very closely akin. In order to determine which ruminant is the source of the blood in any case, we must test separate portions of the stain-extract with anti-goat, anti-sheep, anti-ox, and anti-buffalo sera. The anti-serum which gives the greatest and most rapid reaction will guide us in such a case.

The use of fowls as the source of the various precipitating anti-sera is of great service in India, where rabbits, which are commonly used in Europe, are hard to obtain. The fowls must be carefully isolated for ten days after purchase to exclude those infected with *pasteurella*. Here in Calcutta the Chittagong breed of fowls is to be preferred, as the birds are much larger than those obtainable in Northern India.

The complement-fixation test.—Although this test cannot be carried out satisfactorily in general forensic serological work in India, owing to the large amount of time which one has to spend in doing it, it merits mention, which will be as brief as is consistent with intelligibility. The test is based upon the fact that when an animal receives injections of the washed erythrocytes of another species, its serum in time develops the power of causing the erythrocytes of that other species to become rapidly dissolved if they are brought into contact with the serum in a test-tube.

If we treat a rabbit by means of injections of washed sheep's erythrocytes, made into the ear-vein, and repeated twice at three days' intervals, its serum, if taken on the fourteenth day after the last injection, will be found rapidly to dissolve sheep's erythrocytes but not the erythrocytes of other animals. This treated rabbit's serum contains two elements that are of importance: (1) the complement, and (2) the antibody for sheep's erythrocytes. These must act *in concert* in order that the erythrocytes may be dissolved. If the serum be heated to 56° C. for half an hour, its complement is destroyed and the dissolving power is lost. If, however, to the heated serum be added some fresh rabbit serum or fresh guinea-pig serum, the complement is restored and the dissolving power returns, for

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the antibody is not affected by the heat which destroyed the complement.

Thus if we put into a test-tube some fresh guinea-pig's serum (complement), some heated serum of a treated rabbit (antibody) and some sheep's erythrocytes in suspension in physiological salt solution, the dissolution of the erythrocytes will be speedily brought about, their pigment passing out into the fluid.

If we take complement and incubate it for an hour at blood-heat with an extract of a blood-stain, and then add to the contents of the tube the antibody and the sheep's erythrocyte-suspension, we shall have dissolution of the erythrocytes as before. But if we take complement, and the blood-stain extract, *and some antiserum for the blood that caused the stain*, on incubating these we shall have the antiserum combining with the albuminous elements of the extract. This combination has the property of fixing the complement, so that none is left over to act in concert with the antibody of the treated rabbit's serum when this is added, and consequently when the erythrocytes are added they are not dissolved.

Thus we see that if we have incubated together for an hour (1) complement with (2) the extract of a blood-stain and (3) some anti-human serum and then on adding (4) some heated serum of a rabbit that has been treated with sheep's erythrocytes, and (5) a suspension of sheep's erythrocytes, we obtain dissolution of the erythrocytes, we may be sure that no combination of the albuminous elements of the stain-extract with the anti-human serum has taken place. In other words, we have proof that the stain is not of human blood. If dissolution of the erythrocytes does not occur, this shows that the complement had become fixed before the antibody was added, *i.e.* that the anti-human serum had combined with the elements of the stain-extract, because these are of human origin.

In actual practice the treated rabbit's serum after it has been heated has its power of causing the complete dissolution of 1 c.c. of a 5 per cent. suspension of sheep's erythrocytes in physiological solution estimated: the smallest quantity of the serum that is required for this is noted, and holds good so long as the supply of that particular rabbit's serum lasts. The smallest quantity of the anti-human serum—or anti-equine, etc., serum—which will cause fixation of the complement in the presence of $\frac{1}{100000}$ c.c. of human serum (or equine, etc., serum as the case may be) is determined, and holds good so long as the supply of that particular anti-serum lasts. The requisite amount of the complement must be ascertained on the morning of the day when the test is carried out.

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Altogether a tedious task, which, even after all requisite quantities have been determined, takes at least four hours to perform. Another drawback is the fact that many materials which may have blood-stains on them have, when extracted, an anti-complementary action. This is not removed by boiling, whereas the specific action of the stain-extract is destroyed by boiling. Therefore two series of tubes are needed. In one series are put boiled, in the other unboiled, extracts of the stained materials, and into all are put the necessary elements of the test, the results obtained in the two series being then compared.

Here in India the great difficulty in the way of the observer is the fact that it is exceedingly hard to obtain the very strong anti-serum required to cause complement-fixation in the presence of the minute amount of albuminous material in the very high dilution of the stain extract that is used in practice. The higher the dilution the more delicate the test, because the more specific, and thus the more trustworthy the results obtained by it.

Even were one able to carry out this test here as it is performed in Europe, it would give us only information corroborative, never corrective, of that obtained by the precipitin test. And, as already mentioned, it requires so much time that it cannot be carried out satisfactorily in general work. The day having only 24 hours, of which a certain amount must be consumed in sleep, it is never likely to come into general use in India, we think.

The anaphylaxis test.—This test I have not yet had occasion to employ, but describe it, as it may later be found possible to have recourse to it in those cases in which the results obtained by means of the precipitin test seem to call for corroboration.

It is based upon the fact that when an animal—preferably the guinea-pig, which is very sensitive—receives an injection into its circulation or under its skin of some foreign albumin it develops extraordinary hypersensitiveness to this albumin, so much so that if the first injection be of $\frac{1}{100}$ c.c. of sheep's serum, and the second dose be $\frac{1}{2000000}$ c.c. the body temperature will rise and continue to rise for about an hour, whereas a previously untreated guinea-pig requires $\frac{1}{20}$ c.c. of sheep's serum in order that its body temperature may rise as shown by Friedberger.

The shock caused by larger doses of foreign albumin is much greater in sensitized guinea-pigs. An untreated guinea-pig's temperature will fall if it receives 1 c.c. of sheep's serum

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intraperitoneally; a guinea-pig that has already received $\frac{1}{100}$ c.c. will show a marked fall of temperature if the second dose be only $\frac{1}{100000}$ c.c. given intraperitoneally.

The hypersensitiveness comes into being only after a certain time has elapsed since the first dose of sensitizing albumin was given. Conveniently the fourteenth day may be taken for the second dose in medico-legal work, the test being carried out thus:—

A series of guinea-pigs—say six—is treated by means of injections of $\frac{1}{100}$ c.c. of human, bovine, feline, equine, etc., serum given intraperitoneally or subcutaneously. On the fourteenth day this series is ready for the test. An extract of the suspected stain is then made with physiological salt solution. The guinea-pigs' body temperature is taken, by a special thermometer being introduced into the rectum, and noted. Then each animal receives an intraperitoneal injection of a portion of the stain extract, which has been divided into seven parts. The seventh part is given to an untreated guinea-pig, which acts as a further control.

Now, supposing that our stain is due to human blood we shall have—

		Result.
1.	G.P. sensitized with horse serum . .	nil.
2.	„ „ „ sheep serum . .	„
3.	„ „ „ dog serum . .	„
4.	„ „ „ cat serum . . .	„
5.	„ „ „ pig serum . . .	„
6.	„ „ „ human serum .	body temperature shows marked change.
7.	„ not previously treated	nil.

The change in the body temperature will depend on the quantity of human albumin that was given by the second injection. If this was but small the temperature will show a rise; if the quantity was large there will be a distinct fall.

As will be seen, this test is wasteful of guinea-pigs; for the first animal of our series will now be hypersensitive to equine and to human albumin, the second to ovine and human albumin, and so on. Still there *might* arise a case in which the information afforded by the test would be of value.

Naturally the question of the identity of the blood in a stain with that of a suspected person is one that has arisen in medico-legal cases. Many observers have endeavoured to find

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the answer to this question; amongst these are Landsteiner and Richter,[1] and von Dungern and Hirschfeld.[2] They have found that the bloods of all the individuals that they examined fall into four groups, which they call A, B, AB, and O.

A.—The erythrocytes contain an agglutinable substance A, and the serum an isoagglutinin β. This class is very numerous in Central Europe.

B.—The erythrocytes contain an agglutinable substance B, and the serum an isoagglutinin α. This class is comparatively rare in Central Europe.

AB.—The erythrocytes contain agglutinable substances A and B, but the serum contains no isoagglutinins.

O.—The erythrocytes contain no agglutinable substance, but the serum contains isoagglutinis α and β.

Lattes and others call the groups Aβ, Bα, ABo, $\alpha\beta$O.

Von Dungern and Hirschfeld[3] found that A is much more common amongst Europeans than amongst Indians, who have a higher percentage of B than Europeans, Negroes and Annamites. They go so far as to assume that Northern and Central Europe is the cradle of the A race, while India is that of the B race.

The investigation is conveniently carried out by means of hanging-drop preparations. The erythrocytes to be examined are suspended in isotonic saline solution, and to this a small quantity of the serum, whose properties are being investigated, is added. In practice 1 part of erythrocyte-suspension (1·2 or 2·3), and 2 parts of a 1·2 dilution of serum are employed. Care must be taken to distinguish between pseudo-agglutination and real agglutination, in which irregular masses of erythrocytes are formed, the cells being piled one on the other and their contours lost. So far we have had no occasion to apply this test, whose technique we are practising against the day when it may be required. Here the long distance of most districts from Calcutta may be a serious objection, not only as affecting the suspected individual, but as causing unavoidable delay in examining the blood in the stains, whose elements are subjected to many known and possibly some unknown influences which may affect the results.

Magistrates in this country are eager enough to know everything about stains that are in question in cases before them. We have been asked to furnish information as to whether the blood in stains had been shed by a woman or a man; whether it had been shed before, during, or after the birth of a child; from what part of the body it had come; what the probable

[1] *Zschr. f. med. Beamte*, 1903, p. 85.
[2] *Muenchener med. Woch*, 1910, p. 741.
[3] *Lancet*, 1919, ii. 675.

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age of the person was; also whether a stain had been caused by male or female semen.

Lattes[1] reports a case in which a man was accused by his wife of having been unfaithful. She had found bloodstains on the front of his shirt, and had consulted a clairvoyante, who had confirmed her suspicions.

The man said the source of the blood might be—

(*a*) Some beef that he had handled just before he had micturated.

(*b*) Blood from his urethra, as he had suffered from difficulty in urination for some time.

(*c*) The shirt might have been handled by a neighbour, while she was menstruous.

(*d*) He considered it to be most probable that the blood was his wife's, and that she had stained the shirt with it in order to force him to confess.

As the stain-extracts reacted only with anti-human precipitating serum, bovine blood was excluded, and Lattes proceeded to examine the properties of the extract against the erythrocytes of certain persons. He found that it agglutinated the erythrocytes of two persons known to belong to group B, and caused no agglutination of those of two persons known to belong to group A.

Then he tested the erythrocytes of the man, the wife and the neighbour who was suspected to be the man's paramour. The man and this woman belonged to group A, while the wife belonged to group O, and was therefore excluded as the source of the blood. As there were no vaginal epithelial cells in the stains, Lattes was of opinion that the neighbour could be excluded too, and that the stains had probably been caused by the man's blood, so peace was restored.

[1] *Archivio di antrop. crim. e med. legale*, 1916, 38, 400

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DETAILS OF FINDINGS AS TO 28,693 ARTICLES, SUSPECTED TO BE BLOOD-STAINED, EXAMINED IN 10,5000 MEDICO-LEGAL CASES.

Articles.	Total.	Blood-stained.	Non-mammalian.	Source of blood. Mammalian. Identified. Human.	Identified. Not human	Not identified as to exact source.
Adze	53	26	—	22	S. G. 1	—
Amulets	2	—	—	—	—	—
Anal discharge ..	1	—	—	—	—	—
Apparel, wearing ..	15,144	11,048	46	9761	S. G. 155 Camel 1 O. B. 57 Dog 1 S. G. & H. 8 O. B. & H. 2 Rat 1 G. & H. 2	—
		Human also 1. Horse.				
Areca nut	1	—	—	—	—	—
Arrow	35	29	—	20	S. G. 1	1
Ashes	15	7	—	5	—	1
Awl	9	6	—	5	—	—
Axe	945	476	11	374	S. G. 17 O. B. 5 S. G. & H. 1	14
Bag	14	12	2	10	—	—
Bamboo	911	496	2	394	O. B. 4 S. G. 11	2
Bark	21	12	—	8	S. G. 2	—
Barrel	3	3	—	3	—	—
Basket	27	22	—	19	S. G. 2	—
Bayonet	2	1	—	1	—	—
Beads	28	25	—	21	—	—
Bedding	829	591	2	465	S. G. 1	—
Belt	6	4	—	4	—	3
Bench	2	1	—	1	—	—
Bill-hook	555	341	2	304	O. B. 3 S. G. 2	1
Blood	28	—	—	21	Dog 1 O. B. 1	—
Bone	33	15	—	20	Dog 1 O. B. 2 S. G. 6	—
Book	4	3	—	3	—	—
Bottle	8	6	—	5	—	—
Bow	1	—	—	—	—	—
Bowl	1	1	—	1	—	—
Bracket	3	2	—	1	—	—

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Articles.	Total.	Blood-stained.	Non-mammalian.	Source of blood. Mammalian. Identified. Human.	Not human.	Not identified as to exact source.
Bradawl	1	1	—	1	—	—
Bread	2	2	—	2	—	—
Brick, tile	119	77	1	69	O. B. 1 S. G. 2	—
Broom	10	6	—	6	—	—
Bucket	2	1	—	1	—	—
Buttons	4	2	—	2	—	—
Can, canister ..	8	6	—	6	—	—
Cane	1	1	—	1	—	—
Canvas	3	3	—	3	—	—
Cardboard	3	2	—	2	—	—
Cart	14	4	—	2	O. B. 2	—
Celluloid, sheet of ..	1	1	—	1	—	—
Cement, plaster ..	102	69	—	52	S. G. 5 O. B. 1	—
Chair	1	1	—	1	—	—
,, leg	1	1	—	1	—	—
,, rail	1	1	—	1	—	—
Chain	1	1	—	1	—	—
Chisel	20	8	—	7	—	1
Chopper, straw ..	381	274	—	253	S. G. 2 O. B. 1	—
,, meat ..	10	10	—	10	—	—
,, shell ..	1	—	—	—	—	—
Cigarettes	3	—	—	—	—	—
Coconut-scraper ..	2	2	—	2	—	—
,, shell ..	1	1	—	1	—	—
Coins	19	8	—	6	—	—
Coir	3	3	—	2	S. G. 1	—
Convict's neck ticket	1	1	—	1	—	—
Cordage	137	93	—	85	O. B. 1 S. G. 3 Horse 1	2
Cot	80	54	—	49	S. G. 1	
Cotton wool	23	16	—	15	S. G. 1	—
Cowdung	13	10	—	7	—	—
Crowbar	21	12	—	12	—	—
Curtain	9	5	—	5	—	—
Cushion	1	1	—	1	—	—
Cutter, areca nut ..	3	3	—	3	—	—
,, fish	29	20	—	17	—	—
,, grass	3	1	—	1	—	—
,, leather ..	1	1	—	1	—	—
,, vegetable ..	19	12	—	10	O. B. 1	—
,, wire	4	3	—	3	—	—
Dagger	112	94	—	75	S. G. 3 O. B. 1	—
,, scabbard ..	8	6	—	6	—	—
Dibble	8	6	—	5	—	—
Dirt from finger nail	1	1	—	1	—	—
Door-panel	10	4	—	4	—	—

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Articles.	Total.	Blood-stained.	Non-mammalian.	Source of blood. Mammalian. Identified. Human.	Source of blood. Mammalian. Identified. Not human.	Source of blood. Mammalian. Not identified as to exact source.
Door-frame	2	1	—	1	—	—
Earth	2509	1757	30	1481	O. B. 20	21
		Human also 1.			O. B. & H. 1	
					S. G. 58	
					Cat 2	
					Dog 1	
					Pig 1	
Envelope	1	1	—	1	—	—
Fan	2	2	—	2	—	—
Fæces of tiger (supposed)	1	—	—	—	—	—
Farm implements ..	43	20	1	17	O. B. 2	—
Feather	3	3	—	1	—	—
		Human also 1.				
Fibre, aloe	3	1	—	1	—	—
File	2	1	—	1	—	—
Flesh	23	4	—	10	O. B. 4	—
					Horse 3	
		Human flesh.			Goat 1	
Flesh, cooked ..	3	—	—	—	O. B. 1	—
Fluid	12	7	—	3	S. G. 1	—
Flour	1	1	—	1	—	—
Fork	1	—	—	—	—	—
Fruit	2	1	—	1	—	—
Game board	1	1	—	1	—	—
Glass, pane	8	6	—	5	—	—
Glove	1	1	—	1	—	—
Gourd	2	1	—	—	—	—
Grain	2	2	—	2	—	—
Hair, not adherent to weapon	83	53	—	70	Horse hair 1	—
					Insect 2	
					Cat 1	
					Vegetable fibre 1	
Hair pin	1	—	—	—	—	—
,, tuft of Hindu ..	2	2	—	2	—	—
Halbert	25	16	—	10	S. G. 2	—
Hammer, mallet ..	26	19	—	15	—	—
Harness	11	5	—	4	O. B. 1	—
Hat, turban, cap ..	518	385	1	351	S. G. 2	1
					O. B. 2	
Haversack	2	—	—	—	—	—
Hinge	1	1	—	1	—	—
Hoe	6	5	—	5	—	—
Holdall	2	1	—	1	—	—
Hook	2	—	—	—	—	—
Husk	1	—	—	—	—	—
Iron, bar	16	10	—	9	—	—
,, fragment ..	2	2	—	1	—	—
,, hook	2	—	—	—	—	—
Idol, pole used as ..	1	—	—	—	—	—

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Articles.	Total.	Blood-stained.	Non-mammalian.	Source of blood. Mammalian. Identified. Human.	Not human.	Not identified as to exact source.
Jewellery	281	220	—	195	—	2
Jute	2	1	—	1	—	—
Key	5	3	—	3	—	—
Kitchen utensils ..	19	13	—	11	—	—
Knife	681	494	7	396	S. G. 13 O. B. 8	1
„ sheath	18	11	—	10	—	—
„ sacrificial ..	24	3	—	3	—	—
Kukri	21	11	1	8	O. B. 1	—
„ sheath	6	2	1	1	—	—
Lacquer box	1	1	—	1	—	—
Ladder	2	1	—	1	—	—
Lamp, lantern ..	7	4	—	4	—	—
„ stand	1	1	—	1	—	—
Latch, wooden ..	3	3	—	3	—	—
Leather	1	1	—	1	—	—
Leaves	246	191	2	167	S. G. 2	—
		Mammalian also 1.				
Letter	1	1	—	1	—	—
Lime	1	1	—	1	—	—
Lint	2	2	—	2	—	—
Match	2	2	—	2	—	—
„ box	5	5	—	5	—	—
Material from stained body of accused	1	—	—	—	—	—
Mattings, carpet ..	259	201	16	178	S. G. 6	3
Micro-slide	1	—	—	—	—	—
Mill hand	1	1	—	1	—	—
Money order acknowledgement	1	1	—	—	—	—
Nail-parings	159	14	—	14	—	—
„ iron	1	1	—	—	—	—
Nuts	4	4	—	4	—	—
Oil cloth	4	4	—	4	—	—
Oar	1	1	—	1	—	—
Padlock	2	2	—	1	—	—
Paper	36	28	—	26	—	1
„ currency notes	4	2	—	2	—	—
„ dispensary ticket	2	2	—	2	—	—
Peg	2	1	—	1	—	—
Pencil	2	2	—	2	—	—
Pestle	12	11	—	11	—	—
Pickaxe	10	5	—	3	—	—
Picture	1	1	—	1	—	—
Pincers	2	1	—	1	—	—
Pipe, huqqa	4	4	—	4	—	—
Pistol	2	1	—	1	—	—
Plan of house ..	1	1	—	1	—	—
Plants, various ..	87	66	—	61	O. B. 1	1
Plates	4	4	—	4	—	—

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Articles.	Total.	Blood stained.	Non-mammalian.	Source of blood. Mammalian. Identified. Human.	Not human.	Not identified as to exact source.
Playing cards ..	6	6	—	6	—	—
Plough	1	1	—	1	—	—
Polo stick	2	2	—	2	—	—
Post card	1	1	—	1	—	—
Pot, earthen	61	45	—	41	S. G. 1	—
„ brass	18	20	—	17	S. G. 1	—
„ bell metal ..	10	1	—	1	—	—
Pouch	3	3	—	3	—	—
Powder	3	3	—	3	—	—
Railing	3	—	—	—	—	—
Rake	1	1	—	1	—	—
Razor	87	59	—	52	—	1
Reading-stand for Qoran	1	1	—	1	—	—
Reed	8	4	—	4	—	—
Rice	1	—	—	—	—	—
Rice-pounder ..	6	6	—	6	—	—
Rod	1	—	—	—	—	—
Roller	1	1	—	1	—	—
Sacking	147	125	—	114	O. B. 1 S. G. 1	—
Sail boat	1	—	—	—	—	—
Saliva	2	1	—	1	—	—
Sand	43	38	—	30	—	—
Saw	7	2	—	2	—	—
Scales	1	1	—	1	—	—
Scissors	5	3	—	3	—	—
Scrapings from accused body	1	1	—	1	—	—
Seeds	3	3	—	3	—	—
Serum	1	—	—	—	Goat 1	—
„ for W.R. ..	1	—	—	100 % positive.	—	—
Shells	3	1	—	1	—	—
Shepherd's crook ..	2	1	—	1	—	—
Shoes, sandals ..	150	86	—	72	—	—
Shrine of Lingam ..	1	—	—	—	—	—
Sickle	33	131	2	109	S. G. 2	—
Skin	5	3	—	2	Cat 1	—
Slate	1	1	—	1	—	—
Spade, kodali ..	147	90	—	80	S. G. 1	4
Spear	73	51	—	44	—	—
„ fish	5	2	1	1	—	—
Spectacles	1	1	—	1	—	—
Spoon	1	1	—	1	—	—
Staple	1	—	—	—	—	—
Sticks, bludgeons ..	336	237	2	195	S. G. 9 O. B. & H. 2	1
Stones	711	649	5	567	O. B. 9 S. G. 12	5

(Stones: 649 blood stained, 5 non-mammalian, 567 human — Mammalian also.)

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Articles.	Total.	Blood stained.	Non-mammalian.	Source of blood. Mammalian. Identified. Human.	Not human.	Not identified as to exact source.
Stones, grinding ..	2	2	—	2	—	—
,, roller	1	1	—	1	—	—
Straw, grass	165	147	10	115	S. G. 6 O. B. 2 Pig 1	1
Sugar cane	7	4	—	4	—	—
Sweetmeat	1	—	—	—	—	—
Sword	301	242	—	217	S. G. 2	3
		Mammalian also 2.				
,, belt	1	1	—	1	—	—
,, scabbard ..	42	19	—	1	—	—
,, stick	5	1	—	1	—	—
Table	1	1	—	1	—	—
,, cover	1	—	—	1	—	—
Tape	4	3	—	3	—	—
Teeth	4	3	—	4	—	—
,, pick	1	1	—	1	—	—
Thread	24	19	—	19	—	—
,, sacred, of Hindus	5	4	—	4	—	—
,, waist	1	1	—	1	—	—
Tin	6	5	—	5	—	—
,, box	1	1	—	1	—	—
Tobacco	2	2	—	1	—	—
Toddy-tapper ..	52	21	—	18	S. G. 1	1
,, Hone for	2	2	—	1	—	—
Tongs	6	6	—	6	—	—
Tools	1	—	—	—	—	—
Torch-holder	2	2	—	2	—	—
Trunks, steel	3	3	—	2	—	—
,, wooden ..	2	1	—	1	—	—
Tub	2	2	—	1	—	—
Twigs, roots	53	46	—	41	S. G. 2 O. B. 1	—
Tyre	1	1	—	1	—	—
Umbrella, sunshade	18	8	—	8	—	—
,, cover ..	1	1	—	1	—	—
Vaginal discharge ..	13	4	—	4	—	—
Washings of clothes	6	2	—	1 semen 1	—	—
,, of hands and feet	11	3	—	2	—	—
Waterproof	1	1	—	1	—	—
Wax cloth	1	1	—	1	—	—
,, sealing	1	1	—	—	—	—
Weight	3	1	—	1	—	—
Wheel	5	2	—	1	—	—
Whip	4	3	—	2	—	—
Winnowing basket ..	2	2	—	1	—	—
Wire, fencing ..	3	—	—	—	—	—

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Articles.	Total.	Blood stained.	Source of blood. Non-mammalian.	Mammalian. Identified. Human.	Mammalian. Identified. Not human.	Mammalian. Not identified as to exact source.
Wire, fragments from exploded bomb	3	1	—	1	—	—
Wood, billets, planks	594	372	12	322	O. B. 5 S. G. 8 Goat 1	2
Wrench	1	1	—	1	—	—
Yoke of ox cart ..	3	3	—	3	—	—
Undetermined substance	24	16	2	7	S. G. 1	—
Grand total ..	28,693	20,147	149	17,492	S. G. 351 O. B. 138 Camel 1 Dog 4 S. G. & H. 9 O. B. & H. 6 G. & H. 1 Horse 4 Rat 1 Cat 4 Pig 2 Goat 3 Horse hair 1 Insect hair 2 Vegetable fibre 1	224
		Human also 3. Horse also 1. Mammalian also 5.				

Letters S. G. stand for Sheep or Goat.
,, O. B. ,, Ox or Buffalo.
,, G. & H. ,, Goat and Human.
,, S. G. & H. ,, Sheep or Goat and Human.
,, O. B. & H. ,, Ox or Buffalo and Human.
,, Mam. ,, Mammalian.

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Illustrative Cases.

1. From Murshidabad were sent some **earth and paddy** (unhusked rice) which were suspected to be blood-stained. The accused person, to whom the paddy belonged, stated that if it and the earth were stained with blood this must have come from a fowl which he had killed at a place where the paddy was stored, the earth being from the floor of that place. The spectroscope revealed the presence of blood in the earth and on the paddy-grains. In the earth only elliptical erythrocyte-nuclei were found ; but on the paddy-grains both mammalian erythrocytes and elliptical erythrocyte-nuclei were present. One of the grains had both on it, and, curiously enough, both were present in one field of the microscope when a preparation of this grain was made. Further examination showed that the mammalian blood present was of human origin.

2. In a case of dacoity—gang robbery—from Singhbhum were sent portions of a **shirt and a loin-cloth**, which their owner had stated might well be blood-stained, as on the night before the dacoity occurred he had killed a sheep, and on the night after it he had killed a fowl. Blood was present on both garments ; but no elliptical erythrocytes nor their nuclei were found, so that it was not fowl's blood that had caused the stains. The mammalian corpuscles which were present were found to be of human and not ruminant origin, and thus the explanation given by the accused person was proved to be a pure invention.

3. From Dacca in a murder case were sent four specimens of **earth and a bamboo** that were suspected to be stained with blood. On the bamboo and two of the specimens of earth—one of which had a human hair on it—no blood was found. In one of the remaining specimens of earth were found elliptical erythrocyte-nuclei. This earth was from a spot which the owner of the house, from which it was taken, said had been stained with pigeon's blood. The other specimen showed mammalian erythrocytes, but these were not proved on further examination to be of human origin. At least the story about the pigeon's blood was probably true.

4. In a murder case from Diamond Harbour there was sent the **loin-cloth** of a man who had been seen in the company of the murdered woman shortly before her death. He admitted that the cloth was blood-stained, and explained that this was due to his having killed a duck some time before. Examination showed that in the stains there were present only elliptical erythrocyte-nuclei, and thus his story was corroborated.

5. In Jhelum a mán accused another of attempted murder, alleging that he had shot him with a revolver, at a spot where the ground was found to be stained with what appeared to be blood, and was, according to the complainant, the blood shed by him at the time. Oral evidence of the attack was also forthcoming. The police, who doubted the truth of the charge, sent the **earth** for examination. It was found to be stained with **non-mammalian blood** alone, and the case was dismissed as false.

6. From Dinajpur was sent a **cloth** which a Santhal woman alleged to be stained with her blood, shed when she was ravished. The stains were found to be due to **non-mammalian blood** alone—and no semen was found on the cloth. However, the Magistrate found that the case was true. But he also found that sufficient evidence was not forthcoming against the two men whom the woman had accused of having committed rape.

7. Some **sweetmeat**, which was supposed to have been mixed with **menstrual blood**, in order that it might act as a love-philtre, was sent for

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examination by the man who believed that his affections were being played upon in this manner. There was **no blood present** in the sweetmeat, which consisted of ghi and sugar.

8. A man alleged that he had been cut down with a bill-hook by dacoits and that the blood shed by him had stained some **straw,** which was sent for examination. The straw was found to have only **non-mammalian blood-stains,** and the case was dismissed as false by the Court.

9. A girl said that she had been ravished by three men, and that each of them had had intercourse with her, with profuse ejaculation, while she was held down by the other two. Her **loin-cloth** was stained with blood, but not with semen. The blood was **non-mammalian,** so the charge of rape was not pressed.

10. Some **earth** that had been taken from near the spot where a corpse had been found was sent for examination. The defence was that if blood was present in the earth it must be that of a fowl. There was only **non-mammalian** blood present in the earth.

11. A man was caught **in flagrante delicto** with a calf. He explained that the charge was false, being concocted by the husband of his mistress, who had detected the intrigue but did not wish to bring discredit on himself. His **trousers** were found to be bloodstained, and he alleged that the blood was due to his mistress having been menstruous at the time of their last meeting. However, although according to his account the liaison had lasted for some time, he was unable to give the woman's name. On the trousers were found stains which were **due to human blood and to the blood of an ox or buffalo.** He was found guilty.

12. A man was accused of having stolen and killed a goat. When his house was reached a blood-stained **rag** was found lying in a corner. On being questioned about the stains on the rag he explained that they were due to its having been used as a "diaper" by his daughter, who was then menstruating. Mammalian erythrocytes were found, but further examination showed that these were not human, but of a sheep or a goat—most probably the latter. The man's story was thus proved to be absolutely false.

13. From Dinajpur in a murder case were sent two specimens of **earth** and seven pieces of **bamboo.** The owner of the house from whose yard and verandah the earth had come, and in whose room the bamboos were found, explained that if there were blood found on the articles it was probably that of an eel. Careful examination failed to detect mammalian erythrocytes, but large elliptical erythrocytes and their nuclei were present in great numbers in the stains on the pieces of bamboo. In the specimens of earth blood was present, but no erythrocytes could be found. Further examination showed that none of these articles had been contaminated with human blood. The truth of the explanation given was thus established.

14. From Purnea was sent a bunch of **jute-plants** which were suspected to be stained with blood of an ox, the case being one under section 429 I.P.C. Human blood was totally excluded by the results of the examination, which showed further that the blood on the plants was due to buffalo's or ox's blood.

15. The police of Purnea sent for examination **two sickles, some earth, and a bamboo,** which were suspected to have blood-stains on them. The origin of the blood was held to be doubtful. I was asked whether, if any were found present, it had come from a human being or a fowl. On one of the sickles no blood was present. On the other articles there was blood, which showed many elliptical erythrocytes with nuclei, but no circular erythrocytes. The stain-extracts did not react with anti-human

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serum. Obviously the police had in this case good grounds for their doubts.

16. From Madras were sent scrapings of a blood-stain on the **plaster of the wall of a cow-house,** in which a man was alleged to have been murdered. I found that the stain was due to the blood of a ruminant and not to that of man. Further investigation, carried out at the suggestion of the Chemical Examiner, Madras, showed conclusively that human blood smeared on the plaster was easily identified as human blood —*i.e.* the plaster itself was not contaminated by reason of its site, so as to mask the reaction for human blood, and thus lead the observer into error.

17. The **loin-cloth** of a man who was accused of having committed murder was found to be stained with what looked like blood. He said that if it were really blood it must have come from bugs or other blood-sucking insects which he had found on the cloth and crushed. The stains were found to be due to human blood, but not to contain any vestiges of insect structure. When the case came to be tried he changed his story and stated that the loin-cloth was stained with the blood of his son, who had been kept standing in the sunlight until his nose bled, by the police who had tried to force him to bear false witness against his father. The Court found that both stories were false, but was compelled to quit the man for lack of sufficient proof of his guilt.

18. In a riot-case there was sent some **earth,** which was alleged to be stained with human blood. The place from which it was taken had been pointed out to the police as the scene of the riot, so that suspicion might be removed from the actual aggressors. The earth was stained with the blood of an **ox or buffalo** alone. The fact was that those interested had slaughtered the animal at that spot, with the intention of misleading the police.

19. A **quilt** and a **towel** were sent for examination in a murder case. The defence was that if these articles were blood-stained the blood had come from sores on the body of one of the persons accused. The quilt was found to be stained with **human blood.** The towel, which had been carefully washed, was found to be stained with mammalian blood, whose source could not be accurately determined. As no trace of pus-cells was found on either article the story told by the counsel for the defence was not corroborated by the findings in the laboratory. The chief actors in this murder were sentenced to death.

20. On a **loin-cloth** were found spermatozoa, which were obviously not human, but resembled those of a dog. At some distance from the seminal stain there was a blood-stain which was found to be due to the blood of a **dog.** Some time afterwards the owner of the loin-cloth produced another cloth on which were stains due to **human semen and human blood.** In our opinion he had produced, with some effort, an ejaculation while he was wearing the garment, in order to prove his innocence and our ignorance with regard to the first garment sent for examination.

21. A man was dragged out of his house and murdered in the street. One of his assailants was found to have bloodstains on his **clothes.** These stains were, he asserted, due to the blood of a bullock, which he had slaughtered; but we found that they were due to **human blood** alone. The Jirga, to which the case was referred, found him guilty.

22. A man, who was suspected to have committed a murder, stated that if any blood were found on his **clothes** it must have come from one of his camels. The clothes were stained with blood, which showed only circular erythrocytes, and was found to be of **human** origin alone.

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23. The **clothes** of a man who was arrested on a charge of having committed a murder were stained with blood, which he stated was that of a cow recently slaughtered by him. This was only part of the truth, however: the stains were found to be due to the blood of an **ox or buffalo, and to human blood.**

24. The police suspected that if any blood were present on some **earth** which was sent for examination, it was that of a youth that had been murdered by a man who used to have homosexual relations with him, but had been provoked by finding him copulating with his sister. The family of the accused person admitted that he and the youth had been on these very intimate terms, but alleged that the blood, if any was found in the earth, was that of a cow. The earth was found to be stained with the blood of an **ox or buffalo** alone. The person accused was discharged.

25. A body was found, and as the death had been caused by violence, the police were only too ready to believe the story which was told by A, to the effect that B had confessed to him that he had done the deed with an **axe.** In B's house was found an axe whose blade was thickly smeared with blood. B admitted that he was the owner of the axe, but professed entire ignorance of how it came to be lying where it was found, and to be blood-stained. On the blade was found a hair which had come from the ear of a black goat, and the blood present was found to be of a **sheep or goat** alone. B was released from custody. A, who had tried to fix a false charge of murder on him, is still a free man.

26. A lad of twenty was accused of having ravished a girl of eight. No seminal stains were found on her **garments,** and the blood with which they were stained were found to be that of **sheep or goat** alone. The Judge admitted that this fact cast grave doubts on the other evidence, but convicted the lad and sentenced him to three years' rigorous imprisonment and a fine of ten rupees, or—in default—two months' rigorous imprisonment!

27. For examination was sent some **earth** which was dug up from the alleged site of a rape committed by a boy of 14 on a very young girl. An eye-witness testified to the rape, and the medical evidence showed that the girl had sustained injuries on her genitals; but the earth was found to be stained only with the blood of a **sheep or goat,** probably the latter. The boy received 15 stripes for indecent conduct.

28. The **body-cloth** of the alleged victim of a rape was found to be stained with **non-mammalian and mammalian blood,** which was certainly not of human origin. The Magistrate discharged the person accused, remarking that "the medical evidence makes it almost certain that the girl was raped, but the Chemical Examiner's report throws some doubt on it."

29. In a riot case was sent for examination some **earth,** which was alleged to be stained with the blood of a man who had been speared while defending his crops. The earth was found to be stained with the blood of a **dog** alone. The pleader for the alleged defenders of their crops had to admit that the evidence about the blood being human had been fabricated, and explained that his clients had been driven to concoct it by their fear that one of the chief witnesses in their favour would not support their case. The chief actors in this riot were sentenced to seven years' rigorous imprisonment, the counter-charge, brought by them as innocent defenders of their rights being dismissed as false.

30. In an assault case were sent two specimens of **earth.** The complainant had pointed out the place where he had been beaten, and the earth of this place was dug up. On the next day the alleged assailants pointed out a spot in another field, which they said was stained with

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blood. As no blood had been seen there on the previous day, the investigating police officer suspected that the blood was that of a goat that had been slaughtered overnight, in order to lead him astray. The earth from the first field was found to be stained with **human blood** alone; that from the second field was stained with **human and hircine** blood. The persons accused of the assault were convicted.

31. It was suspected that a murder had been committed at a certain spot A, where the **ground** was stained with what appeared to be blood. The family of the person accused pointed out another spot B as the scene of the struggle. The earth from A was found to be stained with **human blood**; the earth taken from two places at B was found to be stained with **bird's blood** alone.

32. In a murder case a **loin-cloth** and a **coat** were sent for examination. The owner of the loin-cloth stated that it was stained with the juice of the fruit of **Phyllanthus emblica**. When he learned that the stains had been found to be due to human blood, he remembered that on a certain Monday his nose had bled. However, on the Sunday preceding that Monday it had been duly recorded that his loin-cloth was stained—the number of the stains being then noted. Of course his pleader made an attempt to escape by asking the Court to question the man as to whether his nose had ever bled before. When questioned he promptly answered that it used to bleed once a month. The owner of the coat explained that the stains on its front—three—were due to the blood of a water-fowl, which one of his friends had shot about a month before the date of the murder. Two of these stains were due to **human** blood alone; the third was due to the blood of a mammal, whose species could not be determined. On the back of the neck of the coat was found a stain due to the blood of an **ox or a buffalo**. One of this man's cows had been gored by another, and he had dressed its wounds. It is probable that, while bending down to do this, he had got the blood on his coat-collar. The owner of the loin-cloth and the owner of the coat were transported for life.

33. A man complained that he had been beaten, and pointed out the place where his blood had been shed. The police suspected that the **earth** was stained with dog's blood. It was found to be stained with blood, which had become too disintegrated for an opinion as to its source to be formed. The person accused stated that there had been an assault, but that the complainant had committed it, having attacked him in his own house. As a proof of this story he pointed out some stains on the floor of a room in his house. The earth forming this floor was found to be entirely free from blood.

34. One Gajru was asked to give an account of his movements during the period immediately prior to the finding of the corpse of an old woman. He told a long story, in which he made no mention of one Nandlu. Nandlu, on being questioned in Gajru's presence, told that he had seen Gajru following the woman on a certain morning—5 days previous to the visit of the investigating police officer. When Gajru heard this story, he promptly recollected that on the morning in question he had watched Nandlu and two other men, whom he named, following the woman. The spot from which he said he had seen them was held to be too far away for him to identify any one who was walking where he said those men were observed. Later he told how he had seen Nandlu and the others kill the woman. An **axe** and two **clothes** which belonged to Nandlu were sent for examination. The clothes were not blood-stained; the axe was stained with the blood of **sheep or goat** alone. Nandlu and the others were discharged.

35. Two castes in a Madras village had quarrelled. The Nadars

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determined to start a riot, in which a Nadar should be killed, and then to report that he had been killed by the Naickers while he was engaged in worshipping the goddess. One Nadar proposed that his wife, whom he suspected of infidelity, should be the victim. Another proposed that his wife, who had left his protection, was a fit person to be sacrificed for the good of the caste. A third pointed out that his mistress was childless and had no relatives to avenge her death, so she was beaten to death, **after** a telegram had been sent from the nearest Telegraph Office to the district authorities about her having been murdered at the temple by the Naickers. In order to prove this story to be true, the Nadars slaughtered a sheep in front of the temple. When the police managed to get sufficient evidence to warrant the arrest of certain men, one of these was found to have blood-stains on his **loin-cloth**. These were found to be due to **human and ovine** blood. The persons accused were acquitted for lack of sufficient evidence to corroborate the story of the approver.

36. There was sent for examination a **knife** which was suspected to have been used in a murder. It was found to be stained with the blood of an **ox or buffalo** alone. The owner of the knife stated that he had recently cut up buffalo flesh with it. The persons accused of the murder were discharged.

37. In an assault case there was found a blood-stained **cloth**, hidden under the fodder in a manger which belonged to one of the persons accused. He explained that the cloth was stained with the blood of one of his sheep; but it was found to be stained with **human** blood alone, a fact on which the Court laid great stress. Two of the five persons accused were sentenced to rigorous imprisonment for one year.

38. A man complained that his father and brother had been beaten by certain men while asleep in his house. The police discovered that a fight had occurred in the roadway and not in the house, the house having been chosen as its scene in order to add to the assault a charge of housebreaking. The **soil** of the roadway was found to be stained with **human** blood.

39. Three men were accused of having committed culpable homicide. In the case an important point was the scene of the killing, which the prosecution suspected to have taken place at the victim's threshing floor, but the defence alleged to have occurred on the river-bank, where they showed a blood-stained place to the investigating police officer. The **earth** of this place was found to be stained with the blood of a **sheep or goat** alone. However, the stories told by the witnesses for the prosecution differed much from each other, so the three men were discharged.

40. In Sylhet a man swore that he had had his head cut open by a lathi blow, and lost a lot of blood which had soaked into the **cloth** that he was wearing at the time. The Medical evidence showed that the wound was caused by a sharp instrument and not a blunt one, such as a lathi. The cloth was stained with **non-mammalian** blood alone. The man was tried on the charge of fabricating false evidence and sentenced to two years' rigorous imprisonment.

41. A man stabbed his wife and her lover, who died a few days afterwards. He fled, but was caught, and explained that if the stains on his **clothes** were due to blood, it was that of a cow. The garments were found to be stained with **human blood** alone. He was sentenced to five years' rigorous imprisonment.

42. Three men were accused of having murdered a man. A. owned a **field**, in which a spot was stained with what turned out to be **human blood**. The earth of a field belonging to B. was also stained with **human blood**. The **Khalka, patka,** and **pyjamas** of C. were found to be stained. He explained that the stains on the khalka were due to snuff—they were

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found to be due to **human blood**. The stains on the patka and pyjamas he said were due to rust. The patka was stained with **human blood**; the pyjamas had been well washed, but we were able to report that they were stained with the **blood of a mammal,** whose species could not be determined.

43. A man reported that his master had been killed while sleeping at the threshing floor. He was found to have stains, which seemed to be due to blood, on his clothing, and cuts on the palmar surface of the fingers of his right hand. He pointed out to the investigating police officer where the **grass-chopper**, with which the deed was done, was lying in the house of the deceased. He confessed his guilt to a Deputy Magistrate, who noted that he had taken care to ascertain that the confession was made voluntarily, and explained that it would not lead to the man's discharge; also that he had ordered the prisoner's handcuffs to be removed, and had kept him for half an hour in Court—whence all policemen had been excluded—before recording the confession. On the fourth day after the murder was committed the cuts on the man's fingers were found to be three or four days old by the Assistant Surgeon, who examined them. The handle of the chopper was tightly wedged into the ring of the hand by means of a rag, on which the Chemical Examiner found blood-stains. When tried before another Magistrate he said that any blood that was found on the chopper was that of a pigeon which his master had killed with it; and that he had confessed because the police had told him that he would get off scot-free if he did so. At the Sessions trial he stated that there must have been a snake or a scorpion concealed in the grass that he had been chopping, and that its blood had stained the chopper. We found that the rag was stained with **human** blood alone.

He also stated that he had never made a confession, but that the Deputy Magistrate had taken down a statement that was dictated by the two constables who took him to Court. As to the murder, his story was that it had been done while he was asleep, but he had seen three men bearing lathis run away from the spot, being awakened by the noise made by his master. As the night was dark he could not identify the men (it was the second night of full moon). The assessors found him not guilty, but the Judge sentenced him to death.

44. In a murder case it was suspected that a **billhook** had been used to inflict the injuries. The owner of the billhook and his mother stated that they used it to cut beef some four days before the date of the murder, and to cut up a fowl on the day following the murder. On the blade were found stains of the blood of an **ox or buffalo** alone.

45. A man was accused of having committed house-trespass by night. On the **floor** of one of the rooms, and on the floor of the verandah, the investigating police officer found what looked like blood-stains. The owner of the house stated that these had been caused by the blood shed by the accused person, whom his wife had struck with a billhook. The accused person denied this, and said that he believed that the blood was that of a cat, produced **ad hoc** by the owner of the house, who desired to get him into trouble. The earth from the room and verandah floors was found to be stained with **cat's blood** alone.

46. From Jhelum were sent a **kurta** and a **chadar** for examination as to the stains on them. They belonged to one Karim, who was accused by one Bakhash of having killed the son of the latter. The boy's body had been found with the throat cut in a mosque, and at the autopsy it was discovered that death was in all probability due to his having been strangled before the injury to the throat was inflicted. Karim stated that the stains on his clothes were due to the blood of a sheep which he

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had slaughtered. It was found that the stains were due to the blood of a **sheep** or **goat** alone. Karim was discharged.

47. A youth of 19 was caught **in flagrante delicto** with a young **heifer.** On his **loin cloth** were bloodstains. These were found to be due to **human** blood and the blood of an **ox or buffalo,** and the **earth** of the site of the intercourse was found to be similarly stained. The youth confessed before a Magistrate, but after spending a few days in the under-trial prisoners' ward he, as is usual, retracted his confession, which he said had been extracted from him by threats. He was sentenced to 4½ months' rigorous imprisonment in consideration of his youth, and the fact that in Ahmednagar bestiality is a very common occurrence, the animal generally used being a she-ass. The Magistrate was inclined to believe that the offence in this case was brought to notice because the animal was a heifer and a young one.

48. At Hinwaza in Prome District a **bullock** disappeared from the grazing grounds. Two men said that they had seen a man leading it away but could not identify him. Four days afterwards various houses in a neighbouring village were searched, and in one there was found some dried flesh that **looked like beef, but was said to be the flesh of a pony** that had recently died. Two tins full of this much-decomposed flesh were sent for examination, and it was found to be **horse-flesh** alone. The charge of theft of a bullock was dropped.

49. From Nawabshah in Sind a bloodstained **cloth** was sent for examination to the Chemical Analyser, Karachi. It was alleged that a lad had been wearing it when he was knocked down by two men, of whom one then committed **sodomy** with him. Numerous witnesses came forward and testified to his having suffered much laceration of the anus, and it was alleged that he had bled long and freely, also that there were seminal stains on the cloth. Two witnesses deposed as to their having been attracted to the spot by the lad's cries, and as to their having caught one of the accused **in flagrante delicto**. But there was **no semen** on the cloth, and on its being forwarded to us we discovered that the blood on it was that of a **sheep or goat** alone. The accused persons were discharged, and those who had testified against them were called on to show cause why they should not be prosecuted for perjury.

50. From Mianwali was sent a **waistcloth** which was said to be stained with the blood that had come from a **woman's nose** when it was cut by the accused person. He alleged that the blood was that of a **cock** that he had killed. The cloth was found to be stained with **both non-mammalian and human blood.**

51. An oil seller named Dila reported to the police that on the previous day he had found in his field two boys, who had cut a lot of paddy and were going to remove it when he came upon them. He took the paddy away from them, so they called three men to help them. These set upon him and Gobind, who had come to his aid, and a free fight took place. When the case came to trial the alleged paddy-thieves and their friends explained that the case was a false one, and was due to their having had a quarrel with Dila regarding the boundary between their fields and his. In his report Dila has stated that the paddy had been cut at the north-east corner of his land, where he pointed out the stubble to the investigating police officer; but in Court he said that the stubble was on the south-west corner, which abutted on the lands of his assailants He had a small cut on his forehead, and from this he said a large quantity of blood had flowed, and stained the **earth** at the scene of the assault. This earth was sent for examination, and was found to be stained with the blood of an **ox or buffalo** alone. He had no blood on his clothes in spite of the alleged copious hæmorrhage. The Magistrate

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in his finding remarked that he had no doubt about Dila's story being a concocted one, but as there was "unfortunately not sufficient evidence" to bring this home to him, and "no reasonable chance of his conviction," he refrained from sanctioning his prosecution for fabricating false evidence.

52. A bania-pedlar, who used to sell groceries in the villages, had a pack-bullock to carry his wares. This bullock one night returned home alone, and was found to have lost the bell that used to hang from its neck. Next day the corpse of its master was found in the fields of an adjoining village. As there were marks of violence on the body, the police arrested "the only suspicious character" of the village, who denied all knowledge of the matter. He explained that the bloodstains on his **clothes** were those of a **black buck** that he had recently killed, he being a shikari. The clothes were sent for examination, and it was found that they were stained with the blood of an **animal akin to a goat** alone. He was discharged, as it was held that the finding of the bell by him was not a fact, but that he had been induced to "find" it by the investigating police officer.

53. A man who, as the Magistrate noted, was between 60 and 70 years of age, with his body covered with wrinkles, was alleged to have taken two girls aged 14 and 11 behind a bush and there **ravished** the younger of them, who was his niece, all the while keeping the elder by his side. At first this little girl complained of a simple assault, but later began a story of rape. It was alleged that two witnesses stoned the ravisher, who retaliated after he had committed the rape. Other villagers came to the scene, and when they departed left the girls to take care of themselves. When the little girl reached the village she informed the grandmother of her companion, and next morning she was said to have pain in the genitals and to have found blood on her sari. Another story was that she had seen the blood on the sari immediately after the rape, but had not mentioned it to the eye-witnesses of the act. Medical examination revealed rupture of the hymen with some inflammation of the vulva. **No semen** was found on the clothes worn by the ravisher and girl, but on the latter were found stains of the **blood of a sheep or goat** alone. The old man was discharged by the Magistrate, who held that the accusation of rape was false and had been brought because there had been several quarrels between him and the parents of the girl.

54. The cloth worn by a little girl was sent for examination, as it was supposed to be stained with the blood that had flowed from her vulva, as the result of her having been **ravished**. Her story was that the accused man was drunk, and had seized her and dragged her into a walled enclosure, where he had ravished her by holding her down so that her legs were on his shoulders while he effected penetration. She produced two witnesses who, she said, had been urinating in the enclosure at the time, and one of whom had beaten her ravisher with a shoe to make him desist. Of these witnesses, however, one said that all that he knew was that he saw the girl leave the enclosure followed by the accused person, who was drunk; that the girl, who was weeping, said that the man had caught hold of her, and that for thus frightening her he gave the man a beating. The other witness denied all knowledge of the affair. The stains on the **cloth** were found to be due to the blood of an **ox or buffalo** alone. The alleged ravisher was discharged, as the Magistrate held that the case had been got up by the girl's parents, who had stained her cloth merely to exaggerate matters, because she had been terrified by the drunken man.

55. On 8th October a Kumhar girl, aged about 14, accompanied by her little brother, was grazing the family's donkeys outside the village. A young bachelor was said to have seized her by the hand, and in the

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words of the judge, "dragged her into an isolated solitude which was covered with bushes and hedges." Here he is alleged to have thrown her down and satisfied his lust in the most brutal manner. She is stated to have bled freely, and, after the young man had left her, to have gone home crying bitterly, to find that her little brother, who had run away when she was being so brutally treated, had already told his grandmother what had occurred. The grandmother is then said to have told the girl's father, who went to report the matter to the village watchman. On the way, they met the grandmother carrying the girl (aged about 14) in her arms. It was alleged that at that time the girl's lehnga and her legs were "wet with blood." The grandmother washed the girl's vulva and fomented it. The matter was duly reported at a thana 12 miles away, and a constable was sent to arrest the young man, who is alleged to have gone to seek shelter from some zamindars and obtain pardon. The Civil Surgeon reported that "the hymen had been torn some months before, and that there were marks of scratches on the back of the girl, which he thought had probably been caused by nails." The girl's **"lehnga"** was examined by us, and on it were found stains of **semen** and **non-mammalian blood, no trace of human blood** being present. The judge commented on this finding as follows:—

"The presence of semen on the skirt of the ravished girl is an evidence of the very clearest type that some one had sexual intercourse with her in an agitated and confused manner. As for the blood, which has been reported to be non-mammalian, the conclusion drawn by the expert is inconsistent with the very strong evidence for the prosecution. The fact that semen was found on the girl's *lehnga* by the Serologist, side by side with the blood, materially supports the case for the prosecution. The girl gave her evidence in a very simple, honest and unpretending manner, and I was very much impressed by her innocent demeanour.

"The accused pleads that he had driven away the girl's donkeys from his Juar field that very day. This annoyed the kumhars, who falsely charged him with the said crime. The accused gave no evidence to support his allegation, which is obviously too trivial. The girl is still unmarried, and it does not stand to reason that the parents could have degraded themselves so much as to proclaim their daughter's dishonour in such a bad manner. The imputation of rape is the worse kind of allegation against an unmarried girl's character, and it is inconceivable that a father would under any circumstances care to disgrace his daughter so openly in order to avenge himself for such a petty matter as the one asserted but not proved by the accused. In my opinion, the offence of rape is quite proved against the accused. Both the assessors have found the accused not guilty, but have given no reasons for disbelieving the cogent and convincing allegations of the ravished girl Bhagirthi and her brother Haria. Their verdict is altogether perverse and contrary to the positive and reliable evidence for the prosecution. In my opinion, the case is a perfectly true one. Disagreeing with both the assessors, I convict the accused of the offence of rape, and in view of his young age sentence him to eighteen months' R.I."

But the case is by no means so simple as the learned judge thought it was. The question of the presence of non-mammalian blood instead of mammalian on the girl's lehnga is not one of opinion merely, but of hard fact. Apart from this, the absence of any trace of human blood on the garment is, as the judge said, "inconsistent with the very strong evidence for the prosecution"; just as inconsistent, indeed, as is the evidence of the Civil Surgeon who found that the girl's hymen had been torn **"some months before,"** although, according to the evidence for the prosecution, the deed occurred three days before he examined her.

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Incidentally, we may remark that it does not seem to be probable—to put the matter at its best—that a girl "aged about 14," who had walked a considerable distance immediately after the rape, would be carried in her old grandmother's arms, even for a few paces; and there is no mention of her having become unconscious as the result of all the bleeding, which is said to have caused her lehnga and legs to be wet.

It seems to us that the story can be explained thus :—

Some months before, this girl had sexual relations, with the result that her hymen was torn. Whether this was caused by coitus or by manipulations matters not; the point is that she was not so innocent as she might have been, and was not likely to receive injuries from coitus on the day in question, such as would cause profuse bleeding. The scratches on her back were probably caused by her having lain on the ground amongst the bushes during the act to which she had been a consenting party. When all was over she discovered that her little brother had run away, and guessed that he would tell what had happened, so she was ready enough to bear witness that she had been forced to do what she had done. The grandmother naturally tried to save her grandchild's reputation, being ignorant of the happenings of some months before. Whence the non-mammalian blood came is a question. Probably it was that of a fowl, or possibly that of a dove. The quarrel about the Juar field, from which the donkeys were driven by the young man, is obviously but a trivial one; but in India small causes such as this often produce great effects such as a charge of rape. The presence of semen on the lehnga does not lead us to suppose that this act was done "in an agitated and confused manner," as the learned judge wrote. The semen had come from the girl's vagina after she had finished coitus : this is all that can be said of it. Had there been no little brother there that day it is likely that the young man would be still at liberty.

56. When the house of one of those accused of having committed a murder was searched, the following articles which appeared to be blood-stained were seized by the police: A, the bamboo **handle of a dibble**; B, a **quilt**; C, a piece of **bamboo matting**. The man's wife explained that the stains on A were due to **betel-stained saliva**; on B, to bloody **disharge from her vulva**; and on C, to the **blood of a cow**. As a matter of fact, the stains on A were due to **betel** probably; while those on B and C were **certainly not due to blood**. This illustrates the difficulties with which the police have to contend when investigating a case.

57. A man was killed in a frontier village. One Majid was suspected of having taken part in the **murder**. In his house was found a **knife** which appeared to be stained with blood. This, Majid said, was that of a sparrow or some animal, but not human blood. The knife was found to be stained with **non-mammalian and human** blood.

58. In the early hours of the morning, a man who was watching his ground nut field fired at a wild pig which was damaging the crop. After wounding the pig which fell, but recovered and bolted into the jungle, the bullet hit a boy who was on watch on a platform about 100 yards away, and inflicted injuries of which he died. A, the sand and straw on which the wounded pig had rolled, and B, some sticks from the platform on which the boy was sitting, were sent for examination. On A was found **pig's blood** alone; on B, **human blood** alone.

59. In a riot about land a man was killed. His faction, A, declared that the riot had occurred in a certain field, and that he had been killed there. The other faction, B, denied this, and pointed out blood marks in another field as caused by his having been killed there. Some of the bloodstained **straw** found there was sent for examination. Faction A declared that the blood on the straw was that of a **goat**, which had been

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slaughtered to mislead the authorities into believing that the riot had occurred on the land of faction B, and that faction A had been the aggressors instead of the attacked, The stains were due to **human blood alone.**

60. The guardian of a **mosque** one morning found in a corner of the courtyard some blood. This he reported to the leaders of the Moslem community, who informed the police. The blood was sent for examination, and found to be that of a **goat** alone. Obviously it had been put there with the intention of leading the Moslems to believe that the mosque had been defiled by pig's blood. As in most parts of the Empire pigs are kept outside the villages and looked upon, by Moslem and Hindu alike, as scavengers and unclean, it is probable that many of the cases of suspected defilement of mosques which have occurred in the past were not really such. No Hindu would care to touch the body or blood of a pig, however desirous he might be to irritate his fellow subjects, while the killing of a goat is to most Hindus but a small matter, and so long as the fact that it was a goat that furnished the blood is not known to the Moslems, the desired effect can be obtained; for it is not every Moslem who would be content to wait for definite proof as to the source of the blood, before making the matter known to others.

61. A man complained that his **horse** had been wounded when it was at A, in a certain field, and had died of its injuries. The person arrested for the offence showed, on the fourth day, another place, B, as the site of the deed. The earth from A and B was sent for examination, and we found A to be free from blood, while B was stained with the **blood of a horse** alone.

62. X was accused of having committed sodomy with Y, a schoolboy aged 12. Y alleged that penetration had been effected without his knowledge as he lay asleep, but that he was awake before the act was consummated. The defence was that the case was false, aud due to X having dunned Y for one rupee eight annas, the price of a cloth. Y's dhoti was sent for examination as to seminal stains. There were none on it; but we detected a minute speck of blood which was that of a sheep or goat. Of course the barrister for the defence made much of this finding, but as the speck was a very minute one the magistrate held that it did not invalidate the story for the prosecution since, as he put it, no Sub-Inspector of Police gifted with the smallest understanding would have asked for the dhoti to be sent for examination had he known that it had on it a speck of sheep or goat's blood, and the evidence of Y's two roommates was very clear as to X's guilt.

63. A accused B, C and D of having ravished her. She said that B threatened her with a sword, and ordered her to follow him into the jungle. When she refused, C, who was carrying a stick, aided B to carry her off. Then C ravished her, and B and D, who had joined them, did the same. While D was so engaged she managed to get hold of the stick, which C had left on the ground beside her, and lunged with it at D's face, which bled freely, some of the blood dropping on to her bodice. While D was busy washing the blood from off his face she escaped to the house of E, one of her relatives, where see got a cloth to cover her nakedness. A's aunt, F, told a different story. She said that B, C and D had come to her place, and that C had given B a push, which caused himto fall on F, A and G. B felt ashamed, and ran away. First she had said that B had dragged A away, being aided by C. This she explained was due to her having been angry, and she asseverated that it was C who had dragged A away, being aided by D.

The bodice of A was found to have on it stains of blood, but as the blood was non-mammalian alone, her story was not strengthened by the

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fact. It came out in evidence that A was the daughter of a man who had been kept in custody for a day by B's father, who was a magistrate; and that E, who corroborated A's statement of her escape in a state of nudity, was at enmity with B's father on account of a quarrel about money matters. The three youths accused in the case were discharged.

As an instance of how the police, who receive *very* little aid from the general public in this country, are forced to utilize every scrap of what might turn out to be a *pièce à conviction* in a murder case, I may mention that from Diamond Harbour I received (1) some palm-leaves; (2) a bamboo cane; (3) some bamboo matting; (4) two bamboo poles; (5) a cloth; (6) a piece of rope, and (7) a dhoti. All of these were suspected to be blood-stained. On none was there any blood detected, but on the cane were found stains very much like those of blood at first sight, but really due to betel-stained saliva.

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CHAPTER VII.

ASPHYXIAL DEATHS.

THE violent deaths of common occurrence which result from asphyxia more or less directly are: (1) Hanging, (2) Strangulation and Throttling, (3) Suffocation, and (4) Drowning.

The *post mortem* signs of asphyxia which are found in these forms of violent deaths are largely the result of the violent respiratory efforts, at first mainly inspiratory, and latterly attended by convulsions. They are:—

External: (1) Lividity of lips, finger-nails, and skin generally, to be distinguished from hypostasis by not being confined to the most dependent parts. (2) Prominence of eyes, especially in strangulation. (3) *Rigor mortis*, slow in onset.

Internal: (1) Blood unusually fluid from excess of carbonic oxide. (2) Lungs and meninges of the brain may be either congested or anæmic. (3) Petechiæ beneath serous membranes. —These minute extravasations of blood, from the size of a pin's head to a small bean, beneath the pleural covering of the lung ('*Tardieu's* spots') or under the pericardium, are very characteristic of asphyxia, if the deceased was not previously suffering from blood diseases, such as scurvy and purpura, in which petechiæ are apt to occur. They may, however, be absent in undoubted asphyxia, and are most likely to be present when the asphyxia occurs rapidly. They should be looked for especially at the root, base, and lower margin of the lungs, on the pericardium, under the scalp, and in infants on the thymus gland. They are readily distinguished from hypostasis by their punctate or petechial character.

Hanging.

In this form of asphyxial death the body is suspended by the neck and the constricting force is the weight of the body or head. It is unnecessary that the body should be suspended off the ground or other support, or even that it should be in the upright posture.

Suicidal hanging is a relatively rare form of suicide in all countries. In India, statistics show that between one-third

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and one-half of the suicides of both the sexes in the town of Calcutta and in the Panjab, and of the male suicides in the presidency of Madras, hang themselves, whilst in Bombay suicidal hanging is rare. Hanging also is the mode selected by about 18 per cent. of the female suicides in the two last-mentioned presidencies. All the 130 cases of hanging seen by Dr. Mackenzie[1] during nine years in Calcutta were suicidal. Sixty-five were male and sixty-five were female, and all were adults. The alleged causes in these cases were :—

Family disagreement . ..	38	Remorse at having led immoral lives	2
Ill-health	35	Grief on account of the death of a near relation ..	1
No reason assigned	24	Serious illness of a child ..	1
Drunkenness	9	Disappointment in love ..	1
Insanity	9	Jealousy	1
Poverty	4	Theft	1
False accusations	2		
Found in possession of counterfeit coins	2		

The nature of the rope by means of which these 130 persons committed suicide: seventy-three used ropes of various materials and thickness. Thirty suspended themselves by means of their *dhoties*, *saries*, or *chadars*. Twenty-five cases were not noted. One person, a determined suicide, used both a rope and the cloth he wore to destroy himself, and a Brahman hung himself by his Brahmanical thread !

Case.—**Suicide by Brahmanical thread.**—This man was a big, stout Brahman; he returned home late at night boisterously drunk, and commenced to abuse his own family and his neighbours. The family, expecting that he would assault them, locked him out of the house into the outer courtyard, where he entered a cowshed and hanged himself. He twisted his Brahmanical thread into several ply, and was found suspended off the ground by means of it. The mark of the cord round the neck corresponded with the Brahmanical thread. It was very narrow and deeply indented into the skin of the neck, which was parchment-like in appearance.

Homicidal cases are rare in India, except in lynching. Chevers mentions three, one where a woman, with the aid of three men, hung her husband in revenge for having beaten her some days previously; another where a husband hung his wife as a punishment for adultery; and a third where the inhabitants of a village, discovering a man from a neighbouring village in the act of committing a theft, hung him on a tree in the middle of their village. More frequently in India, in homicidal cases where the body is found hanging, the cause of death is strangulation or mechanical violence, and the body has been hung to avert suspicion (see *Cases* next page). Accidental cases also are rare, but are sometimes met with. Judicial hanging: this is the judicial mode of execution in India.

[1] *Ind. Med. Gaz.*, 1888, p. 299.

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Case.—**Murder by strangulation; subsequent suspension** of the body.—A man of Mymensing, having intrigued with a widow, and not giving her sufficient means for her support, she complained to the village *panchayet*, who decided that both parties should be beaten. The man was seized by his father, and was struck several blows, but the woman managed to escape. The paramour, enraged at having been summoned and beaten before the *panchayet*, pursued her with three of his relatives. On coming up with her, they strangled her, and, hanging her body on a tree hard by, reported that she had committed suicide.—Chevers, *Med. Jur.*, p. 529.

Case.—The father and brothers of a girl, of Tipperah, finding her in company with a man with whom she was intriguing, seized the man, and holding him down by the neck, arms, and legs, strangled him. They then hung up the corpse, and reported that he had destroyed himself.—Chevers, *ibid.*, p. 592.

Case.—A Bogra woman was found hanging. *Post mortem* examination showed clearly that strangulation by hand, and not by hanging, was the cause of death.—Chevers, *ibid.*, p. 593.

Case.—**Murder by mechanical violence; subsequent suspension** of the body.—A man of Sylhet struck his wife with a piece of split bamboo about the body until she died, for eating more than her share of *pan* (betel). He then hanged her body on a tree.—Chevers, *Med. Jur.*, p. 597.

Case.—The wife of a man living in the 24-Parganas having a criminal intrigue with another Hindu, she and her paramour enticed the unfortunate man out of his house at night, killed him, or rendered him insensible (it would seem by severe blows), and suspended his body to a tree.—Chevers, *ibid.*, p. 598.

Case.—It appeared, in a trial at Cuttak, that a Hindu, charging another with theft, beat him to death. The man's body was afterwards found suspended, with marks of violence upon it, in such a position as to render it evident that he had not hanged himself.—Chevers, *ibid.*, p. 598.

Case.—A man, probably trampled to death, body found hanging. A Hindu, aged about sixty. *Post mortem* appearances—"Face livid and slightly swollen, especially on right side, on which the body had been laid. The tongue was not swollen or bitten by the teeth. A bruise about 1½ inch in diameter on right side of the forehead. A livid depressed mark, about ½ inch in diameter, round the neck and behind right ear. In front of the neck the mark was between os hyoides and thyroid cartilage. There was another depressed mark under the forehead. *Head.*—Considerable amount of coagulated blood in tissues of pericranium, corresponding to bruise on forehead. Brain healthy, slightly congested on surface. A considerable quantity of fluid in ventricles, and at base of brain. *Chest.*—A large quantity of extravasated coagulated blood among muscles and tissues covering the ribs. The ribs, from the third to the last, were fractured in two places on both sides; lungs healthy, uncongested; heart empty. *Abdomen.*—Extensive rupture of liver on its posterior aspect; all other organs healthy."—Harvey's *Beng. Med. Leg. Rep.*, p. 83.

Case.—Punctured wound mistaken for a gunshot wound, body suspended after death.—In this case, a Mussulmani, aged thirty-eight, was at first reported to have died from hanging. There was a rope close under the chin, passing upwards behind the ears, and the head was bent on the chest. On lifting the head, a wound, described by the medical officer who made the examination as a gunshot wound, was found between the attachments of the sterno-mastoid muscle, a little above the clavicle. The wound contained a large clot of blood, and its edges were turned downwards and inwards. Apparently it was not seen until the head

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was lifted. The right lung was torn through from apex to base, and a circular hole, of the same size as the one in the neck, passed right through the liver. The right kidney was bruised, but not wounded. A large quantity of blood was found in the cavity of the thorax, and a large quantity also in the abdomen. Deeming the wound a gunshot wound, the medical officer, not being able to find the bullet, gave as his opinion that it had probably passed behind the kidney into the thigh. The woman's husband afterwards confessed to having killed his wife, by thrusting a pointed perfectly circular solid bamboo into her body. The body was afterwards hung up to avert suspicion.—*Ibid.*, p. 214.

Case.—**Suicidal hanging, Partial suspension.**—In 1907 a Brahman lunatic in the cells of the Bombay Police Hospital hanged himself from the bars of the door, 33 inches from the ground, with his sacred thread, by lying in an inclined position.—Prof. Powell, Bombay.

Case.—**Accidental hanging.**—" During the breakfast hour at a cotton mill near Aberdeen, one of the men was toying with a female fellow-worker to whom he was attached, and in sport threw around her neck a loose leather strap suspended from the roof of the apartment. At this moment the machinery was set a-going, and the girl was drawn up to the roof by the strap, and suspended there for a few minutes before the engine could be stopped, too late for saving her life."—Ogston, *Med. Jur.*, p. 528.

Case.—**Death from hanging.—Arsenic found** in viscera, probably self-administered.—In a case from Shahapur (Thana district), the body of a Mahar was found hanging to a tree outside a village. On examination, there was found an abrasion of the skin round the neck just below the chin, commencing from the thyroid cartilage, and extending backwards and upwards on both sides, with discoloration of the parts around. Both lungs were found gorged with blood, and the brain was congested. The mucous membrane of the stomach was red, and had yellow patches on it. On analysis, arsenic was found in the viscera, about four grains being present in the contents of the stomach.

Mode of death in hanging depends on the way the cord is applied, and on other circumstances. It may be by :—

1. **Fracture** or dislocation of cervical vertebræ, followed by almost instant death from pressure on the spinal cord. This occurs when the body falls some distance before the strain comes on the rope, and is the mode of death sought to be attained in judicial hanging.

2. **Asphyxia,** from constriction of the air passages, with rapid death. Death from pure asphyxia does not often occur in hanging, though Dr. Mackenzie states it was the most common mode in his 130 cases.[1] It may, however, occur if the rope is tied low down the neck, and a knot or some hard object contained in the ligature presses directly on the trachea.

3. **Apoplexy,** from pressure of the ligature on the large veins of the neck, if the tape is tied too high up the neck.

4. **Mixed asphyxia and apoplexy.**—This, except in judicial hanging, is the most common mode of death, occurring in about 77 per cent. of

[1] *Loc. cit. Ind. Med. Gaz.*, p. 299.

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those cases of death from hanging in which the cause of death is other than fracture of the neck.

In Dr. Mackenzie's 130 cases no less than 119 or 91·54 per cent. died from asphyxia; 8 or 6·15 per cent. from asphyxia, as well as apoplexy; 2 or 1·53 per cent. from syncope, and 1 or 0·76 per cent. from apoplexy.

Rapidity with which death occurs varies.—It occurs almost instantaneously if the neck is fractured, rapidly if death takes place by apnœa; and least rapidly if apoplexy is the mode of death. If there is no injury to the spinal cord, and the stoppage of air is not complete, five to eight minutes is the common fatal period; but it is possible that life may be restored after even half an hour's suspension.[1]

Treatment.—If the body of the person hanged is cut down before life is extinct, attempts at resuscitation should be made by opening a large vein to relieve the right side of the heart and cerebral congestion, followed by warmth and friction and diffusible stimulants, especially ammonia and sternutatories, and endeavours to restore the respiration and circulation by manipulation as in drowning, which see. The attempts at artificial respiration must be persisted in for a long time until natural breathing is established or the case proved to be hopeless.

Post-mortem signs.—These are generally those of asphyxia with the special signs in addition.

1. **Signs of the 'mode' of death**, *e.g.* fracture or dislocation of the cervical vertebræ; or the *post mortem* appearance of asphyxia or apoplexy, one or both.

In all the 130 suicidal cases examined by Dr. Mackenzie no fracture or dislocation of the neck was found; but the following case is reported by Dr. H. G. Johnston of Jamaica, W. I.

Case.—**Fracture**.—**Dislocation in suicidal hanging**.—A negro aged 24 (D. McL.), a sufferer from extensive chronic ulcer of the leg, climbed a tree and tied a thin (⅓ inch diameter) bark rope to a horizontal branch, and put the other end of the rope by a slip-noose around his neck, and threw himself down about a five-foot drop. When found, his feet were only a few inches from the ground, the knot being behind the left ear. There was a fracture-dislocation of the axis.

2. **Mark of cord**.—This in death from hanging is usually, but not always, oblique and non-continuous, *i.e.* does not completely encircle the neck. It is usually (in about 81 per cent. of cases) situated between the chin and the larynx, and is very seldom (in about 2 per cent. of cases) below the larynx. In appearance it is usually a well-defined furrow, which, according to the length of the period of suspension, may (*a*) show no change of colour, or at most a red blush; or (*b*) be condensed and white

[1] Tidy's *Legal Medicine*, II. p. 191.

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at the bottom, the edges presenting either no change of colour or being red, and the skin beyond violet; or (c) if the period of suspension has been long, be dry, hard, yellowish-brown, and horny, resembling parchment.

In Dr. Mackenzie's cases in which a rope was used, the mark on the neck was well-defined, indented, and parchment-like, while in the cases where cloth ligatures were used, the marks were faint, of a reddish colour, and not parchment-like, except in places where the cloth was twisted, and where the pressure was great.

Abrasions are sometimes found in the course of the mark, but ecchymosis is rare; and sometimes *there may be no mark.* After noting the exact situation and external appearance of the mark on the neck, two incisions should be made round the neck, one about an inch above, and the other about an inch below, the mark. These should be connected at the back of the neck by a vertical cut, and the skin carefully dissected up from behind forward. The subcutaneous cellular tissue will then usually be found to show a condensed white or yellow line. The underlying soft parts and the spine should then be examined. Such dissection should be made also in all cases where strangulation is suspected.

In not one of Dr. Mackenzie's 130 cases were the muscles of the neck, the larynx, trachea, or large bronchi injured, and in none of them was there any extravasation beneath the skin of the neck, or blisters above the constriction of the cord.

Much local injury may be found in cases where, as in judicial hanging, the body falls some distance before the strain comes on the cord. Such cases excepted, much local injury points to strangulation rather than to hanging; or if hanging be the cause of death, to homicidal, rather than to suicidal hanging.

3. **Other appearances.**—The face may be found pale, the features placid, and the eyes not unduly prominent. This Harvey found to be the most usual condition in fresh bodies; or, especially if decomposition has set in, the face may be found swollen and the eyes protruding. In only 37·5 per cent. of Dr. Mackenzie's cases were the eyelids open, and eyeballs protruding. Pupils are nearly always dilated. Tongue is pressed against the teeth, or partly protruding between them and bitten. Genital organs frequently show signs indicative of excitement, accompanied by discharge of mucus, or sometimes of blood, and in males by emission of seminal fluid. Expulsion of urine and fæces sometimes takes place. Lungs.—Congestion of the lungs is by no means invariably present. Out of 834 cases of death from hanging, included in the returns reported on by Harvey, in 738 the lungs were congested, in 77 natural, and in 19 collapsed. Rupture of the superficial air cells, spots of sub-pleural ecchymosis, and apoplectic effusions into the substance of the lungs, are all infrequent in hanging, but may be present.

Saliva running in straight lines down the chin and chest are usually found, and if present, are important as indicating suspension during life.

In Dr. Mackenzie's 130 cases, in 81 the position of the tongue was noted, and in 41 or 50·61 per cent. it was found to be protruded between the teeth, but not injured; in 61 cases a note was made as to whether it was bitten, and of these the tongue was found injured in 16 or 26·22 per cent. A note was made in 40 cases regarding the eyes, and in 15 or 37·15 per cent. the eyes were open, and the eyeballs were protruded. In 21 cases frothy mucus was looked for around the mouth and nostrils, and in 20 or 95·23 per cent. it was found; 91 cases were noted regarding two lines of mucus at the angles of the mouth, and it was present in 23 or 25·57

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per cent. The condition of the fingers was noted in 42 of the persons hanged, and they were found to be flexed or clenched in 17 or 40·47 per cent. The condition of the nails was noted in 15 cases, and in every one of them they were found to be of a blue colour. In 92 cases 30 or 32·60 per cent. had vaginal or urethral discharges. Out of 23 cases noted, 8 or 34·78 per cent. had discharge of fæces from the rectum. In 8 cases the condition of the penis was noted, and in 3 or 37·50 per cent. it was found to be erected. The hyoid bone was found fractured in 24 cases or 25·80 per cent. out of total of 93 observed. Notes were made regarding the thyroid cartilage in 64 persons suspended, and of the cricoid cartilage in 11, and in not one of either set of cases was it found to be fractured. Of the 90 cases in which the **coats of the carotid arteries** were observed, in 31 or 34·44 per cent. they were found to be ruptured. In 16 or 51·61 per cent. of these 31 cases, the internal coat, in 4 or 12·90 per cent. the middle coats, and in 11 or 35·48 per cent. both the internal and middle coats, were ruptured.

Questions regarding Hanging.

The chief medico-legal questions connected with death by hanging, are :—I. Was Death due to Hanging? and II. Was the Hanging Suicidal, Accidental, or Homicidal?

I. Was Death due to Hanging?

With reference to this question, it may first be pointed out that in a case of death from hanging, where the period of suspension has been short, or a very soft ligature has been used, there may be no mark at all on the neck. Hence the absence of a ligature mark on the neck does not absolutely contra-indicate hanging as the cause of death.

A ligature mark on the neck does not necessarily indicate suspension of the body (see 'Strangulation,' p. 222); but when due to suspension of the body, it is, as a rule, high up on the neck, oblique, and non-continuous. Suspension of the body, therefore, is indicated by the presence of a ligature mark on the neck, with a force proportionate to the degree of agreement of the mark with these characters. In very exceptional cases, however, a mark, possessing all these characters, may be produced without suspension; *e.g.* when the body has been dragged along the ground, during life or after death, by a ligature round the neck. In such a case, abrasions of the skin due to the dragging will probably be found (see *Case*, p. 155). Suppose, however, suspension of the body to be proved by direct evidence, or strongly indicated by the characters of the ligature mark on the neck, death may yet have been due to a cause other than hanging, and the suspension of the body effected after death. That a ligature mark on the neck, in all respects resembling the mark left by the cord in a case of death from hanging, may be

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produced by suspension of the body after death has been amply proved. Casper found that such a mark was produced when bodies were suspended within two hours after death; and Tidy states that an ecchymosed mark may be produced within three, and a non-ecchymosed mark within six, hours after death. This being so, to establish the fact that death was due to hanging, requires not only proof of suspension of the body, but also proof that such suspension was the cause of death. Such proof may be afforded by the presence of the general *post mortem* appearances, already enumerated, of death from hanging. If these are absent, careful search should be made for the presence of signs of death from a violent cause other than hanging. This is extremely important, as murder cases are not infrequently met with in India, in which the murderer suspends the body of his victim after death, with the object of imitating suicidal hanging (see *Cases*, p. 215). In such cases (see first *Case*) the cause of death sometimes is strangulation, and when this is so, the general *post mortem* appearances present may closely resemble those of death from hanging (see 'Strangulation').

II. Was the Hanging Suicidal, Accidental, or Homicidal?

In cases of death from hanging the presumption is always in favour of suicide, even if the body is found only partly suspended. Numerous suicidal cases are on record, in which the body was found partly suspended, with the feet touching the ground, or in a sitting, reclining, or kneeling posture. Powell mentions a remarkable case of this kind (see *Case*, p. 216). Suicide, however, may be negatived by the body being found suspended in such a manner as to show that the individual could not have hung himself. Again, supposing the *post mortem* appearances to show that death was due to hanging, the discovery of an irritant poison, *e.g.* arsenic, in the body but little affects the presumption in favour of suicide. Harvey mentions two cases in which individuals, after having taken arsenic, hung themselves apparently in order to escape the suffering caused by the action of the poison (see, however, *Case*, p. 216). Death being due to hanging, marks of mechanical violence present on the body only positively contra-indicate suicide when the violence indicated is sufficient to have caused immediate insensibility. Mechanical violence short of this, if from its characters self-inflicted, strengthens the presumption in favour of suicide. That suicidal hanging may follow self-infliction of a very severe wound is shown by a case cited by Harvey, in which a man hung himself after inflicting a wound on his throat four inches long, dividing the thyroid

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cartilage and œsophagus. Non-self-inflicted violence, not sufficient to have caused immediate insensibility, may be present in a case of suicide, and in fact form the motive leading to it. (iv) Age of deceased is important, as children rarely commit suicide.

Accidental hanging is rare. It is sometimes, however, met with, chiefly in cases were children have been playing at hanging. Cases also are recorded where individuals giving a hanging exhibition have been allowed to remain too long suspended, with fatal results. In one case an adult was found accidentally hung in a gymnasium; and a very exceptional case of accidental hanging is mentioned by Ogston (see *Case*, p. 216).

Homicidal cases are also rare.—A few, however, are on record where hanging, pure and simple, appears to have been the cause of death, *e.g.* the three cases mentioned by Chevers, already referred to. In such cases, as a rule, a number of persons are concerned in the murder. A person, however, who is weak, or insensible, or even asleep, may be murdered by hanging by a single other individual. Ogston, for example, mentions a case "where a woman tied a ligature round the neck of her husband while he was asleep, and then pulled him up." Cases are more common where individuals are first rendered insensible (or it may be killed) by mechanical violence, or by strangulation, and then subsequently hung, *e.g.* the Bompard Case in Paris.

The presence of marks of self-inflicted mechanical violence tends, as already pointed out, to strengthen the presumption of suicidal hanging. When marks are present, clearly due to the infliction of mechanical violence by another, such marks may indicate the employment of violence sufficient to have caused (*a*) death, or (*b*) immediate insensibility, or (*c*) insufficient to have caused either of these effects. In case (*a*) the absence of the general *post mortem* appearances of death by hanging obviously confirms the indication of homicide. In case (*b*) the general *post mortem* appearances of death by hanging may be present, but still homicide is indicated. In case (*c*) it is often quite impossible, from the *post mortem* appearances, to arrive at any conclusion as to whether the hanging was suicidal or homicidal.

If strangulation has been employed previous to suspension, evidence of this may be afforded by the presence on the neck, in addition to the mark due to suspension of the body, of marks indicating strangulation (see below). It may here, however, be pointed out that two cord marks on the neck, one

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having the characters of a strangulation, and the other those of a hanging mark, may be found in a case of simple hanging, if the cord has been passed twice round the neck.

If very severe injuries are found to have been produced by the cord, *e.g.* laceration of the muscles or other underlining soft parts, the presumption is in favour of homicide or a long drop. Much injury to the soft parts may, however, be met with in suicidal hanging, if the individual has arranged matters so that his body falls some distance before the strain comes on the cord. Homicide is obviously indicated if the body is found suspended in such a manner, or the hands are found secured in such a way, as to show that the individual could not have hung himself.

Strangulation and Throttling.

Homicidal strangulation is easier to commit than homicidal hanging, and it is sometimes falsely alleged by defaulting cashiers and others to screen delinquencies. Accidental strangulation may happen to epileptics and also through the pressure on the throat of high collars, see case below (p. 225).

In strangulation the constriction of the throat is produced by other means than the weight of the body or head. The means used may be fingers (= 'Throttling'), the foot, knee, clothing, etc. Strangulation differs from hanging in that it may be effected without a ligature, *e.g.* by pressure with the fingers, or some hard object. The modes of death in strangulation are the same as in hanging, hence the *post mortem* appearances are also very similar. The main points of difference between the *post mortem* appearances of strangulation and those of hanging are important, as strangulation is usually homicidal, whereas hanging is suicidal.

1. **Mark** or marks on the neck :—

(1) If a ligature has been used, there will, save in very exceptional cases, be found a mark on the neck. This usually, but not invariably, differs from a hanging mark, in being transverse in direction, low down on the neck, and continuous, *i.e.* completely encircling the neck. In exceptional cases of strangulation, especially if the body has been dragged by the ligature, the mark may be found high up on the neck, and oblique in direction, like a hanging mark. Again, in exceptional cases of hanging, the mark may be found low down on the neck,

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and, if the cord has been tightly applied, the mark left by it may be transverse in direction, like a strangulation mark. Abrasions and ecchymoses in the course of the mark, and injury to the underlying soft parts, are much more common in strangulation than in hanging; but the hard yellow brown parchmenty appearance of the skin in the course of the mark is more seldom met with.

(2) Strangulation by manual pressure is tolerably common in India, the victim being usually a child or a female. Where this mode has been employed, marks made by the thumb and fingers are almost invariably found on the neck; sometimes, however, these marks of violence are only visible on dissection. Usually the marks found on the neck in such cases clearly indicate how the strangulation has been effected.

(3) Strangulation by compression of neck with a stick or other hard substance, is often met with in India. Usually, one stick placed across the front of the neck is used; but sometimes two sticks are employed, one placed behind, and the other in front of the neck. This mode of strangulation causes a central bruise on the front of the neck, and usually severe local injury such as fracture of the cartilages or hyoid.

2. **Asphyxial** and other appearances.—The lungs, as in hanging, may be found uncongested. According to Tardieu, patches of emphysema on the surface of the lungs, due to rupture of the superficial air-cells, are invariably, and apoplectic effusions into the substance of the lungs commonly, present in death from strangulation; while punctiform sub-pleural ecchymoses ('Tardieu's spot'), common in suffocation, are rare in strangulation. But Professor Powell's unique experience shows that Tardieu's statements are more emphatic than warranted, as patches of emphysema are *not* invariably found. And ecchymoses are *not* rare in strangulation, or in hanging.

Saliva running in straight lines down the chin and chest, a common appearance in death from hanging, is not likely to be present in strangulation.

In three cases reported by Dr. Mackenzie, in none of them were the appearances in the air-cells of the lungs or about the skin of the face, neck and chest and conjunctiva mentioned by

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Tardieu found. In all these cases the eyes were closed. In none of them were muscles or other deep structures of the neck injured. In these cases the tongue was not swollen; in two it was protruded between the teeth and was bitten into but not through. In none were the fingers clenched.

Questions regarding Strangulation.

As in hanging, the chief medico-legal questions connected with death by strangulation, are : I. Was Death due to Strangulation ? and II. Was the Strangulation Homicidal, Suicidal, or Accidental ?

I. Was Death due to Strangulation ?

It may first be pointed out, that in very exceptional cases, death may occur by strangulation, without any mark being present on the neck. This may happen if a soft ligature has been used. It rarely, however, occurs, as even when a soft ligature is employed, much superfluous violence is commonly applied, and a distinct mark on the neck is usually present. If no marks of violence, either external or internal, are to be found on the neck, strangulation is very strongly, but not positively, contra-indicated. When strangulation has been effected by means other than the use of a ligature much violence is almost always used—often to other parts of the body as well as the neck—and there is seldom any difficulty in arriving at a conclusion as to the cause of death. Here, however, it must be remarked, that in very exceptional cases of death from natural causes, finger-marks may be found on the neck, accompanied by the *post mortem* appearances of death from asphyxia. An individual dying from asphyxia the result of disease, *e.g.* epilepsy, may, in his struggles for breath, by clutching at his throat, produce such marks. Hence, if the only marks of violence present on the body are slight finger-marks on the neck, a guarded opinion must be given as to the cause of death.

Case.—**Strangulation.** (? Suicidal); finger-marks on the neck probably caused by deceased himself.—A man was found dead in the house of a prostitute, who had been his mistress for three years. Deceased's cousin was sleeping in the same house with another prostitute, and was called early in the morning by deceased's mistress, who appeared to be much alarmed at his (deceased's) condition. The cousin found him apparently dying, and removed him to his own house. A *post mortem* examination was made, and showed death to be due to *apnœa*. Three marks were found on deceased's throat such as would be produced by finger-nails. The surgeon who made the examination thereupon reported strangulation to be the cause of death, and deceased's mistress was tried and convicted of the murder. It, however, appeared that deceased had been subject to

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epileptic fits, and many of the circumstances of the case being strongly against the supposition of homicide, the High Court reversed the conviction, holding that the marks on the throat might have been produced by deceased himself.—Chevers, *Med. Jur.*, p. 580.

Ligature mark on the neck, corresponding in external appearance to a strangulation mark, cannot of itself be taken as evidence of death by strangulation. Such a mark may be the result of the application of a ligature to the neck after death, or have been accidentally produced by the pressure of a tight-fitting article of dress, or be the result of putrefactive swelling against a string tied loosely round the neck. In the last two cases, however, injury to the underlying soft parts, common in strangulation, is not likely to be found. Hence, even when a ligature mark is found on the neck, corresponding in appearance to a strangulation mark, to establish the fact that death was due to strangulation, requires proof that the pressure of such ligature was the cause of death. Such proof may be afforded by the presence of the general *post mortem* appearances of death by strangulation. It must, however, be recollected that in hanging, as well as in strangulation by a ligature, death is due to the pressure of a ligature on the neck. Further, that in hanging the presumption is always in favour of suicide, while in strangulation it is in favour of homicide. Hence, in all cases of death from pressure of a ligature on the neck, all appearances indicating the cause of death to be hanging, rather than strangulation, or *vice versâ*, should be most carefully noted.

II. Was the Strangulation Homicidal, Suicidal, or Accidental?

Accidental cases are rare: a few, however, are on record.

Case.—**Accidental strangulation by bonnet-strings.**—Elizabeth Kenchan, an extremely dissipated, drunken, and disorderly woman, went to bed intoxicated with her bonnet on, and in the morning was found strangled in its strings. She had fallen out of bed, her bonnet became fixed between the bedstead and the wall, and she, being too drunk to loosen the strings, was strangled.—Guy, *For. Med.*, p. 262.

Case.—**Accidental strangulation by neckerchief.**—A man was carried to bed very drunk, and left there with his clothes on. It was supposed that afterwards he had got up so far as to lean over the front of his bed to vomit, with his hands pressed on the pit of his stomach, as he was found dead in this posture in the morning. His neckerchief was so tight around his neck that the contraction thus caused would have sufficed to produce strangulation, from his inability to change his position, in the helpless condition he was in at the time. The inspection, by presenting all the appearances which were to have been expected under such circumstances, left no doubt but that accidental strangulation was the cause of death.—Ogston, *Med. Jur. Lect.*, p. 543.

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Case.—**Accidental strangulation by basket-strap.**—A girl was accidentally strangled in the following manner: She was employed in carrying fish in a basket at her back, supported by a leather strap passing round the front of her neck above her shoulders. She was found dead sitting on a stone wall; the basket had slipped off, probably while she was resting, and had thus raised the strap which had firmly compressed the windpipe.—Taylor, *Med. Jur.*, II., p. 67.

Case.—**Accidental strangulation by high collar.**—A gentleman farmer, W. H., of Kingscliffe, near Peterboro, died yesterday of strangulation during a heart-seizure through his throat falling forward on his high collar and causing asphyxia. Major G. P., of Pimlico, died in November last under similar circumstances.—*Daily Express* (London), Jan. 28, 1920.

Suicidal cases of strangulation by a ligature are sometimes met with. To effect suicide in this way requires the employment of some means whereby the ligature is kept tight, independently of any muscular effort on the part of the suicide; so that relaxation may not occur when insensibility supervenes. This end may be arrived at in various ways, *e.g.* by simply passing the ligature more than once round the neck; or, by securing the ends of the ligature to the foot, or to the wrists in such a manner that the ligature is tightened when the arms are extended; or to some fixed object. Or, it may be arrived at by twisting a stick in the tied ligature, and securing the end of the stick; or by simply knotting the ligature. As regards this last method, it may be noted that the presence of more than one knot raises a suspicion of homicide; two knots have, however, occasionally been found in suicidal cases; more than two knots very strongly indicates homicide.

Homicidal cases.—Just as in hanging the presumption is always in favour of suicide, so in strangulation the presumption is in favour of homicide. Homicide is very strongly indicated, (*a*) when a ligature has been employed, by the absence of evidence indicating the use of some means for the purpose of keeping it tight after insensibility has occurred; (*b*) by the presence of signs indicating the application of much violence to the neck or to other parts of the body, and (*c*) when the strangulation has been effected by means other than the use of a ligature. Obviously homicide also is almost conclusively indicated if the hands are found tied together in such a way as to show that they could not have been so secured by the individual himself.

Case.—**Homicidal strangulation.**—On April 4, 1888, Shaikh Haru left his home in good health, and the same evening his body was found tied up in a box, and Mihir Ali, of the Doveton Institution, was suspected of the crime. At the *post mortem* examination, made on the day of the death, the body was found tied by means of three cords, one made

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of jute, another of hemp, and a third of cotton. Thighs flexed on the abdomen, the legs on the thighs, the knees resting on the left side, and middle of the chest 3½ inches above the left nipple. Left arm was tied above the wrist to the left leg, 10 inches below the left knee. Right arm was tied to the right thigh 6 inches above the right knee. The *first* cord was of jute. It was about ½ inch in diameter; it was tied round the lower part of the neck, the knot was double; it was tied on the front of the lower part of the neck just above the manubrium of the sternum. It was then carried downwards over the middle of the chest behind the knees, then upwards along the left side of the chest round the back of the lower part of the neck, then downwards along the right side of the chest to the right wrist, where it was tied to a narrow hempen cord. The *hempen* cord was ⅛ of an inch in diameter; at its commencement it was double; it passed from the back of the right wrist downwards for about 3 inches to the middle and outer side of the right thigh; it then passed backwards round the lumbar region to the back of the left elbow. At this place the cord became single; it then passed round the left forearm, 3 inches above the back of the left wrist, then across the middle and front of the right thigh, and was tied here to a part of the same cord, where it was turned backwards round the lumbar region. The *third* cord was made of soft cloth; it was twisted round into two ply, and then doubled. It was tied tightly round the lower part of the neck; the colour of this cord was white, with a streak of pale red and another streak of light pale blue in it. It was tied tightly round the lower part of the back of the neck by means of an ordinary double knot. This cord was beneath the jute cord. An abrasion 3 inches long and ⅛ of an inch broad on the right cheek extended outwards from the right angle of the mouth. The abrasions of the lips and abrasion at the right angle of the mouth and on the right cheek had the appearance as if a gag had been applied to the mouth. The other signs of strangulation were present. OPINION: that the deceased died from asphyxia, due to strangulation. Mihir Ali was found guilty of murder, and sentenced to be hanged; but his sentence was commuted by the Government to transportation for life.—Dr. Coull Mackenzie, *Ind. Med. Gaz.*, 1888, p. 232, etc.

Case.—**Homicidal strangulation.**—A *gharami*, or thatcher, named Gopal Bairagi, eloped from his native village in the Birbhum district with a young woman named Bow, and the pair came to Calcutta and lived as husband and wife. The neighbours said they frequently quarrelled. On the night of the 8th July, 1878, they retired to bed, and on the next morning the man could not be found, and the body of the woman covered with a quilt and a gunny bag, her mouth gagged with a piece of cloth, and a coir rope tied tightly round her neck. The body, examined on the 9th July, showed a mark of a cord round the neck immediately below the thyroid cartilage and a contusion of the left eyeball. A piece of cord was twisted twice tightly round the mouth and a double cord made of two twists of thin coir rope tied tightly across the middle of the neck. The skin beneath this cord was parchment-like. There was no extravasation of blood beneath the skin or into the muscles of the neck, nor injury to the muscles of the neck or to the wind-pipe. OPINION: that the deceased died from asphyxia due to strangulation. Gopal Bairagi, after some months, returned to his native village, where he was apprehended. He was tried at the High Court and acquitted, as the only evidence against him was circumstantial, which the majority of jury (natives) would not rely on.

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Suffocation.

Under 'Suffocation' are included all cases of asphyxia (drowning excepted) caused by violent means other than direct pressure on the wind-pipe, as for example:—(1) By closing the mouth and nostrils; (2) by pressure on the chest; (3) by blocking of the lumen of the glottis or air tubes; and (4) by an atmosphere deficient in oxygen.

1. **Closing the mouth and nostrils.**—This may be (*a*) Homicidal, as in cases of infanticide effected by closing the mouth and nostrils with the hand. The mouth and nostrils in homicidal cases also may be closed by plasters applied to the face; this was the way in which the resurrection men, Burke and Hare, murdered their victims in Edinburgh. Burke, after conviction, confessed to sixteen murders effected in this way in a few months. Again, soft pillows may be employed, as in the case of the two princes murdered in the Tower of London. (*b*) **Accidental,** as in cases where children are accidentally smothered by their *mothers* **overlaying** the infants in bed. (*c*) **Suicidal.**—Cases of suicide effected in this way are extremely rare. Taylor, however, mentions a case of a woman who is reported to have committed suicide by simply leaning with her mouth and nostrils pressed against the bedclothes.

2. **Pressure on the chest.**—Suffocation caused in this way is generally accidental, usually occurring from either accidental smothering by burial under the *débris* of fallen buildings, earth, etc.; or pressure in a crowd, as in the case which occurred in Paris in 1837, in which twenty-three persons were suffocated in this way in a crowd in one of the streets. A case also is recorded of a man who, while a plaster cast of his trunk was being taken, was nearly killed by the pressure on his chest of the solidifying plaster. Homicidal cases are sometimes met with in India. In homicidal cases, if the victim is an adult, and was not first rendered insensible, or was not a consenting party, probably several persons will be found to have been concerned in the murder. Often great violence is used, sometimes causing symmetrical, or nearly symmetrical, fractures of the ribs (see p. 127). In children great violence may be employed, sufficient, in fact, to cause extensive injury to the lungs without fracture of the ribs. Under the head of homicidal suffocation by pressure on the chest may also be mentioned (1) the burial alive of widows with their husbands' body, a custom formerly prevailing, to a certain extent, in India; and (2) the *samádh* or burial alive of lepers—often with the consent

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or at the entreaty of the victim—cases of which used formerly to be not infrequently met with in India. Suicidal suffocation by pressure on the chest is hardly possible.

3. **Closure of the glottis.**—Suffocation thus caused often occurs accidentally from the impaction of foreign bodies—masses of food, for example—in the throat or air passages, often by pieces of food during an inspiratory act whilst vomiting, especially if drunk or under the influence of chloroform, or by swallowing false teeth, etc., or from spasm of the glottis, the result of disease or of the inhalation of poisonous or irrespirable gases. Powell reports a case of this sort by impaction of a round worm in larynx. Suicidal suffocation by closure of the glottis, effected by forcing rags, articles of dress, etc., into the fauces is sometimes met with. Homicidal cases are rare in adults. Children, however, are sometimes murdered by filling their mouths with mud or other soft material.

4. **Deficient Oxygen**, such as the fumes of wine or beer vats, or bursting of the carbonic acid pipes in a refrigerator.

Post mortem appearances in death from suffocation.

1. **Appearances of asphyxia.**—Cases, however, have occurred of undoubted death from suffocation, where most of the *post mortem* appearances of asphyxia were absent. On this point Christison, in the case of the woman Campbell, murdered by Burke the resurrectionist, remarked, "the conviction in the public mind that a well-informed medical man should always be able to detect death by suffocation, simply by an inspection of the body, and without a knowledge of collateral circumstances, is erroneous, and may have the pernicious tendency of throwing inspectors off their guard, by leading them to expect strongly marked appearances in every case of death from suffocation. That such appearances are very far from being always present, ought to be distinctly understood by every medical man."

2. **Punctiform sub-pleural ecchymoses,** or 'Tardieu's spots' (p. 221 and below), are usually present in cases of suffocation. Powell reports two large apoplectic effusions in a child whose death was caused by plugging the larynx with a rag.

3. **Appearances of violence** sufficient to cause suffocation, *e.g.* marks of violence on the chest, marks indicating the application of manual pressure, or of plasters over the mouth

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and nostrils, foreign bodies impacted in the throat, etc. Cases, however, of death from suffocation by violence may occur, and no appearance of this class be present.

Questions regarding Suffocation.

As in hanging and strangulation, these are:—I. Was Death due to Suffocation? and II. Was the Suffocation Accidental, Suicidal, or Homicidal?

I.—Was Death due to Suffocation?

The chief points bearing on this question are:—

1. **The signs of asphyxia** may be nearly **absent**, and yet death may have been caused by suffocation (see Christison's remarks just quoted).

2. **The signs of asphyxia** may be **present,** and those of drowning, hanging, and strangulation absent, and yet death may not have been the result of suffocation by violence, but may have been due to asphyxia, the result of disease, or poison, *e.g.* epilepsy, tetanus, or strychnia poisoning. Hence, in cases of alleged suffocation by violence, much depends on the presence or absence of signs indicating the employment of violence, such as would produce suffocation. If these are absent, no positive opinion can be given, from the *post mortem* examination alone, as to the cause of death.

3. **Tardieu's spots** (p. 213). If these are numerous, well defined and limited in size, on the lungs and thymus gland they contra-indicate strangulation, and indicate suffocation to be the cause of death. Their presence, however, is consistent with death from causes other than suffocation. They have been met with in the bodies of adults after death from drowning, hanging, strangulation, scarlatina, heart-disease, apoplexy, pneumonia, and relapsing fever. They are almost the rule in plague. They are also found in the bodies of still-born, and even unborn, infants. Further, their absence does not, at any rate in the case of adults, conclusively contra-indicate suffocation. Ogston failed to find them in nine cases of death from suffocation in adults.

II.—Was the Suffocation Accidental, Suicidal, or Homicidal?

1. **If the deceased** is an adult, the presumption is always in favour of accident. Curious accidents leading to suffocation

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by closure of the glottis sometimes occur. Suicidal cases are rare, but are sometimes met with, *e.g.* the case of suicide by closure of the mouth and nostrils already referred to above, p. 228. A case also is reported in which a prisoner committed suicide by stuffing his mouth with rags, another in which a young woman suffocated herself by stuffing a large ball of hay into her throat, and another of a young woman who committed suicide by shutting herself up in a trunk. Homicidal cases are not often met with. In a homicidal case, unless the victim was suffocated while insensible, marks showing the employment of much violence will probably be found.

Case.—**Accidental suffocation by plums.**—Dr. Mackenzie relates that of a native female child of about four years of age, who, while playing about under a country plum tree, ate a quantity of its unripe fruit, and was shortly seized with a severe attack of vomiting. The parents took her to a native practitioner, who, after giving some medicines, recommended that she should be removed to hospital, but on arrival the child was dead. The body, examined the next day, was found well-nourished with no external marks of violence. The finger nails were of a blue colour, the eyes not sunken, and the skin of the fingers and toes not shrunken. The lungs, the liver, the spleen, the kidneys, and the vessels of the brain were congested. The heart was healthy, the right side full of dark fluid blood, the left side empty. The stomach, the intestines, the bladder, the uterus, the ovaries, the vagina, and the substance of the brain were healthy. The larynx, trachea, aud large bronchi were full of half-digested green plums, and the stomach contained a quantity of half-digested green plums. The intestines contained well-formed fæces and half-digested green plums. No bones were fractured. OPINION: That the child died from suffocation owing to the half-digested green plums passing into the air passages during a deep inspiration while in the act of vomiting.—*Ind. Med. Gaz.*, 1890, p. 295.

Case.—**Accidental suffocation by meat.**—A European sailor, J. K., who had been drinking heavily, while eating a mutton chop began to vomit and suddenly became insensible. He was removed to hospital, but on arrival was dead. Post-mortem a piece of the chop, $3\frac{1}{2}'' \times 1''$, was found firmly wedged into the entrance of the larynx.

Case.—**Suffocation in a Chest.**—A sweeper in the Byculla Club. Bombay, in the habit of sleeping in a wooden trunk, was found dead of suffocation in 1916. The lid, which was almost vertical when open, had accidentally fallen down and the hasp had become fastened.—Prof. Powell's *Reports*, 1917.

Case.—**Accidental suffocation.**—"In 1850, Dr. Whyte reported the case of a strong Madras water-carrier into whose mouth a fish had jumped while he was bathing. On opening the mouth, the tail of a large cat-fish presented itself, with the body firmly fixed within the fauces, and filling up the isthmus completely. It had entered flat, so that the fin of one side was posterior to the velum, and opened out on any attempt being made to withdraw the fish. The operation of œsophagotomy was commenced and was abandoned. A piece of cane was made into a probang, and, with it, attempts were made to press the fish downwards into the

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œsophagus. It did pass downwards, when the patient at once ceased to breathe, gave one convulsive struggle and died to all appearance. The trachea was immediately opened, and respiration was restored. In the course of the night the man coughed up the fish, the fins having become softened by decomposition."—Chevers, *Med. Jur.*, p. 619.

Case.—**Accidental suffocation.**—" In 1865, a native boy about four years old was brought to the Calcutta Medical College Hospital, with a *coir* fish impacted in his glottis. These fish are very tenacious of life out of water. The poor child appears to have taken up the fish, and to have put its head into his mouth. In its struggles, its head passed the glottis, and all attempts to withdraw it were prevented by the catching of its gill-plates, anchor-wise, below the vocal chords. The child was suffocated."—Chevers, *ib.*, p. 619.

Case.—**Accidental suffocation.**—" A private soldier, *æt.* 28, was discovered, at night, by the man lying next to him to be breathing loudly and with great difficulty, as if there were some obstruction about the lower part of the trachea. He was at once removed to the dispensary, where he died in about fifteen minutes. Several small pieces of potato were found in both bronchial tubes, where these subdivided into small branches. There was great œdema of the glottis, no doubt from the irritation caused by a foreign body. The deceased had drunk some beer and also rum in the course of the evening, before retiring to rest. He had been sick, and had vomited while in bed."—Chevers, *Med. Jour.*, p. 618.

2. If the deceased is a child or infant suicide is, of course, contra-indicated, and the question lies between accident and homicide. Accidental cases often arise from **overlaying,** or from accident during birth (see 'Infanticide').

Fatal overlaying of infants by parents in bed through carelessness occurs chiefly amongst the poor, and is rare after nine years of age, as the child is then strong enough to extricate itself. In suspected overlaying the death may sometimes be due to fatal teething or cerebral convulsions during the night. In addition to marks of suffocation, marks of pressure on the body or face should be looked for, *e.g.* a flattened nose. Cases are reported by Dr. Westcott, coroner of N.E. London (*Trans. Med. Leg. Soc.*, I. 1903, 44), of overlaying of infants by the domestic cat and by the infant burying its face in a pillow.

Homicidal suffocation is sometimes met with in children, and frequently met with in infants, by stuffing the mouth with rags, or filling it with cowdung or dirt, these being common modes of infanticide in India.

Case.—**Homicidal suffocation.**—A lad from thirteen to fifteen years of age was sentenced, at Agra, to transportation for life for having robbed a girl of four, his near relative, of her ornaments after having filled her mouth with *bhusa* (bran). The civil surgeon deposed that death had

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been caused by suffocation, consequent upon the mouth of the deceased being filled with *bhusa*.—Chevers, *ib.*, p. 616.

Case.—**Homicidal suffocation.**—An old woman of Tirhut, finding a little girl of six digging up some grain from her field, felled the child with a heavy clod, and then suffocated her by pressing her clothes against her mouth until she ceased to breathe. She then stripped off the clothes and ornaments, and buried the corpse.—Chevers, *ib.*, p. 616.

Case.—A girl aged about twelve. Body far advanced in decomposition; no marks of violence externally, but on cutting into the skin of the chest, extensive bruises and bloody effusions were found over the whole front aspect of the ribs. The ribs were not fractured. The right lung was natural, but the left had been most severely injured by compression and had become a jelly-like mass. The girl had probably been thrown down, and then had her chest compressed by the weight of her assailant's body. —Dr. McReddie, in McLeod's *Beng. Med. Leg. Rep.*, 1868-69, p. 36.

Drowning.

This mode of violent death from asphyxia is by submersion of the mouth and nostrils under water or other fluid, so that access of air to the lungs is cut off. This form of asphyxial death differs from the other forms, in that water or other submersing fluid is drawn into the lungs during attempts at respiration.

Causes.—Accidental cases are common among the seafaring population of the coast and inland, especially among females, from falls into wells and tanks.

Suicidal cases are also common in India. In the Madras and Bombay presidencies, over three-fourths of the female and nearly one-half of the male, suicides drown themselves. In European countries also, drowning is a mode of suicide often selected, ranking, as a rule, second in order of frequency. In Dr. Mackenzie's 305 cases of drowning at Calcutta, only 2·62 per cent. were suicidal, the reasons assigned being family disputes, insanity, and bodily disease. Homicidal cases are rare, but are sometimes met with in India. Dr. Mackenzie had only one such out of 305 cases.

Mode of Drowning.—When a person falls into water he sinks, but usually, if not stunned, rises again to the surface, probably by the movements of his limbs, and tries to breathe, in which case death occurs by asphyxia. In his struggle, he takes in some water, which striking the glottis causes cough and forcible expiratory efforts, and the raising of a portion of his body out of the water, causing him to sink a second time.

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He may again rise to the surface by the movements of his limbs, again struggle, and sink. Ultimately, in consequence of the expulsion of air from the lungs, and the specific gravity of the body being greater than that of water in the proportion of 1·08 to 1, the body ceases to rise. The subjective sensations are said by the resuscitated to be mental confusion followed by pleasing dreams. Where the person sinks at once and does not rise again during life, death is due to 'inhibition' or some precedent condition, *e.g.* syncope, epilepsy, etc.[1]

Submersion of the whole body is not necessary for drowning, as drunkards, epileptics, and children have been drowned in shallow puddles or vessels containing only a few inches of water.

Case.—**Drowning in shallow water.**—Dr. A. Powell gives these two cases:—Patu m., *æt.* 20, liable to epileptic fits, for which he had been under treatment at intervals for two years, went to work in some muddy rice land on 14th May, 1890. An hour later he was found dead, lying with his face downwards in a shallow pool. The water was so shallow that only his mouth, nose, and the right side of his face were immersed, the left eye and side of face being above the surface. The rest of his body from the neck downwards was on dry ground. *Post mortem.*—The mouth, nasal cavities, and air passages contained mud and green water weeds.—*Ind. Med. Gaz.*, 1897, p. 300.

Case.—Mazli, *æt.* 26, attended in hospital for epilepsy. On August 23, 1890, she was found dead, face downwards in an almost dry drain. I measured the depth of the water at once and found the maximum for some distance to be 2 inches, except a depression of 3½ inches where her head had lain. *Post mortem.*—Air passages contained sand and muddy waters with a few blades of grass; skin of face soddened *à la blanchisseuse;* elsewhere *cutis anserina* marked. Uterus contained an eight months' fœtus.

For other two cases see Appendix.

Mode of death.—In the great majority of cases death is due to asphyxia. Almost all the balance is due to inhibition or syncope. Apoplexy, if by this is meant cerebral hæmorrhage, is most rare, and if prominent would be the cause of death and not drowning. Excitement, whether due to a struggle against drowning or against an enemy in a fight, or trying to catch a train, will make a diseased artery give way and cause apoplexy.

In Dr. Mackenzie's 305 cases, 297 or 97·37 per cent. persons died from asphyxia; 1 or 0·32 per cent. from syncope; 1 or 0·32 per cent. from asphyxia and apoplexy, and in 6 or 1·96 per cent. the mode of death could not be ascertained, on account of the bodies being in a very advanced state of putrefaction.

Period at which death takes place.—This varies with the mode of death. It is instantaneous if from shock, rapid if

[1] F. Crookshank, *Trans. Med. Leg. Soc.*, 1910, 13-21.

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from pure asphyxia, less rapid if from a combination of asphyxia with syncope or cerebral congestion. When death occurs from pure asphyxia, asphyxia commences as an outside limit after two minutes' complete submersion, and death takes place within five minutes. Recovery is rare after five minutes' complete submersion.

The longest record dive under water is 4 minutes 45½ seconds by Miss E. Wallenda in a tank at the Alhambra Music Hall, as tested by expert timekeepers.—*Whitaker's Almanack.*

Treatment should, however, be persevered with, until it is certain that death has taken place, (*a*) because in exceptional cases animation has been restored after more than five minutes' complete submersion, (*b*) because the submersion, although alleged to have been complete, may not have been so, and (*c*) because by persevering treatment, individuals have been recovered, who have shown no signs of animation for several hours; in one case of recovery it is said that there were no signs of animation for 8½ hours.

Period at which dead body floats.—The body eventually comes to the surface, if not entangled, when putrefactive gases make it sufficiently light to float. The length of time for this varies with the temperature of the air, water, the sex, etc. Fat bodies float sooner than thin. In hot weather a body may float within 24 hours after drowning, but it is seldom possible to estimate from the bodies the length of time since death.

In the Hughli river at Calcutta Dr. Mackenzie found that if there was no obstacle to impede the rising of bodies they generally floated in the hot and rainy season within 24 hours of the immersion, and in the cold season in from two to three days.[1] In Dr. Mackenzie's 305 cases, in 138 or 45·28 per cent. putrefaction was present; in 5 or 1·63 per cent. the bodies were saponified; in 124 or 40·65 per cent. the bodies were fresh; and in the remaining 38 or 12·45 per cent. no note was made as to their condition.

Case.—**Buoyancy of decomposed body.**—A woman was killed on the night of a Friday, and the evidence went to show that the body must have been thrown into a well about midnight. On the following Sunday morning, about meal-time, which was about 8 or 9 A.M., the body was found floating with a heavy stone attached to it. The woman was said to have been of slight figure and short stature, and therefore probably, when alive, did not weigh more than 100 to 105 lbs. The stone itself weighed 92 lbs., so that the decomposition in 30 hours must have been so rapid as to generate gas capable of raising, not only the body itself, but the dead-weight attached to it. The stone was attached to the waist, and the body, when

[1] *Ind. Med. Gaz.*, 1889, 131. See also Art. by Prof. Powell in *I. M. G.*, 1904.

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found, was lying horizontally on the surface of the water on its side. The water was from ten to twelve feet in depth, and the specific gravity of the stone was 2·7. This case is of interest, as showing the extreme buoyancy of a decomposed body in water, and the rapidity with which gases can be generated. The murder occurred in September, 1883.—Gribble, *Med. Jur.*, p. 99.

Treatment of Apparently Drowned Persons.

Attempts at resuscitation should be commenced at once. First get rid of any water in the mouth, and upper air passages, etc., by placing the body for a few seconds, face down, with the head a little lower than the feet, keeping the mouth open, and the tongue drawn forwards. Next turn the body on the back, as quickly as possible, strip it, rub it dry, and apply warmth

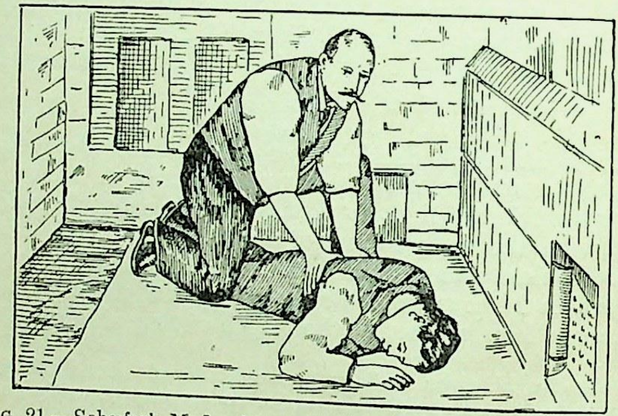


FIG. 21.—Schæfer's Mode of resuscitating the Apparently Drowned.

to the surface, and weak ammonia or snuff may be held to the nostrils by some other person. If respiration is not restored, commence artificial respiration immediately.

Artificial respiration.—The best and easiest method of performing artificial respiration is **Schaefer's.** It is safer, more efficient, and easier to apply than the older methods of Marshall Hall (prone pressure and rolling), of Howard (supine pressure), and of Silvester (forcible traction on the arms, followed by bringing these back to the side of the chest, and pressure on the chest). In the Schæfer method,[1] amongst other advantages, the face of the person being placed downwards the tongue falls

[1] E. A. Schæfer, in *Medico-Chirurg. Trans.*, 1904.

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downwards and out of the way of the wind-pipe whilst water and mucus run out, and the muscular exertion required by the operator is very much less than in the other methods. Its mode of application will be seen from the illustration.

Directions.—Instantly on removal from the water place the patient face downwards on the ground with a rolled-up coat under the lower part of the chest so that the head hangs down, and the patient's arms bent and placed under his forehead to keep nose and mouth clear of the ground. The operator puts himself athwart the patient, or kneels by his side facing his head. Then place your hands flat over the lower part of the back (lowest ribs), one on each side, and gradually throw the weight of your body forward on them so as to produce firm pressure, which must not be violent, on the patient's chest. By this means the air (and water, if there is any) is driven out of the patient's lungs. Immediately thereafter raise your body slowly so as to remove the pressure, but leaving your hands in position. Repeat this forward and backward movement (pressure and relaxation of pressure) every four or five seconds. In other words, sway your body slowly forwards and backwards upon your arms twelve to fifteen times a minute, without any marked pause between the movements. This course must be pursued for at least half an hour, or until the natural respirations are resumed. If they are resumed and, as sometimes happens, again tend to fail, the process of artificial respiration must be again resorted to as before. Whilst one person is carrying out artificial respiration in this way, others may, if there be opportunity, busy themselves with applying hot flannels to the body and limbs, and hot bottles to the feet; but no attempt should be made to remove the wet clothing, or to give any restoratives by the mouth until natural breathing has recommenced. Hypodermic injections of atropine sulphate ($\frac{1}{100}$th to $\frac{1}{50}$th grain), and of supra-renal extract (either as adrenalin chloride or in any other form) may be used to assist recovery.

When spontaneous breathing returns, apply heat by water-bath or friction, and when swallowing returns give a little brandy and water. This treatment should be persisted in for several hours—flushing and convulsive twitchings of face and gasping indicate returning breathing. The prospect of resuscitation is better when the cause of apparent death is inhibition than in asphyxia.

Questions regarding Drowning.

The chief medico-legal questions connected with drowning, which must be kept in view when making the examination, are:—(1) Is life extinct? (2) The *manner* and cause of death. What is the probable cause of death, was it Drowning, or some other cause operating before immersion? and (3) Was the Drowning Accidental, Suicidal, or Homicidal? The first question is answered under the 'Signs of Death.'

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II. Was Death due to Drowning or to some other cause operating before immersion ?

Signs of drowning in body.—The external signs will vary according to length of time the body has been submerged. As in 87·5 per cent. of cases of death from drowning, the mode of death is asphyxia, pure or mixed, the *post mortem* appearances of death from asphyxia will usually, but not invariably, be found. Thus usually the right side of the heart will be full, and the left side empty, and the lungs and venous system engorged. Great congestion of the lungs, especially if accompanied by sub-pleural ecchymosis, indicates that the struggle for life has been great. Whether, however, the *post mortem* appearances of apnœa are present or not, other appearances indicative of death from drowning must be searched for, because (*a*) asphyxia, if present, may have been the result of causes other than drowning, and (*b*) the mode of death may not have been apnœa, and yet death may be due to drowning.

Post mortem signs other than those of asphyxia which indicate death by drowning are as follows :—

Externally.

1. **Froth in the mouth and nostrils.**—This froth, like fine '*shaving lather*,' although usually present in death from drowning, disappears soon after the body is removed from the water. It is often also present in death from causes other than drowning, *e.g.* in epilepsy, and in cases of death from asphyxia not due to drowning.

2. **Cutis anserina,** or goose-skin, if present, indicates that immersion took place either during life or shortly after death; no conclusion can however, be drawn from the absence of this appearance: Powell points out that it is due to contraction of the erector muscles of the hairs and that it disappears with *rigor mortis*, which is usually early.

3. **Retraction of the penis.**—This is the result of cold, terror and arduous struggling, and is frequently found in cases of drowning; it may be absent in tropical waters; the colder the water, the more marked is the shrinking.

4. **Sand,** mud, weeds, sticks, etc., grasped in the hands or sticking under the nails, are evidence of struggles in the water during life, and hence presumptive evidence in favour of death having been caused by drowning; abrasions on skin, especially hands.

Internally.

1. **Water in the stomach,** especially if this contains matters such as are present in the water of immersion, *e.g.* algæ, diatoms, etc. Water is usually found in the stomach if the individual was sensible at the time

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of immersion. It is highly improbable that after death, water can enter the stomach, hence the presence of this *post mortem* appearance indicates it to be highly probable (*a*) that the individual was sensible at the time of immersion, and (*b*) that as a consequence death was due to drowning, though not necessarily negativing either of those probabilities absolutely. Powell found water in the stomach in about 60 per cent. of cases of drowning.

2. **Water in lungs.**—The lungs are distended with indrawn water and full of bloody froth in bronchi, so that, Powell points out, the distended lungs feel sodden and œdematous and do not collapse on opening the pleura. Water may transude into the pleural cavities.

3. **Mud**, sand, or floating matters mixed with water in the lungs or wind-pipe.—This is evidence of even greater value than the last-mentioned appearance in favour of the supposition that the individual was sensible at the time of immersion, and that, therefore, death was most probably due to drowning.

In conclusion, it must be remembered that in many cases where death is undoubtedly due to drowning, *post mortem* evidence may be indefinite or altogether absent. In such cases, it is the duty of the pathologist to say he has found no evidence, or no definite evidence of drowning, but that such finding is consistent with death from drowning. In many such cases where no lay evidence is forthcoming juries usually give the verdict of "Found Drowned." A more logical verdict would be "Found dead in the water." As decomposition advances *cutis anserina*, froth in the nostrils, froth and water in the lungs, and water in the stomach successively disappear. The penis and scrotum become ballooned with emphysema. Hence, in all cases of suspected drowning, the *post mortem* examination should be held at the earliest possible opportunity.

It should be noted that the *post mortem* appearances of death by drowning may be altogether absent, and yet drowning may have been the cause of death. In such case the absence of appearances indicative of death from a cause other than drowning, *e.g.* violence, poison, or disease, must be ascertained by careful search.

III. Was the Drowning **Accidental, Suicidal, or Homicidal?**

Death from drowning is, as above noted, usually accidental, more seldom suicidal, and rarely homicidal, except in infants. The fact, however, of the body being found in water does not necessarily imply death from drowning, as the person may have been murdered first and afterwards thrown into the water. Thus the body found in water should always first be examined for marks of violence. On the other hand, some suicides inflict

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wounds on themselves before drowning and have even tied their feet together and weighted their bodies with stones, etc. Valuable indication of insanity or otherwise may be obtained from papers or notes in the clothing. (N.B.—Sodden papers should be unfolded in water and *not* first of all dried.) Sometimes no indications are afforded as to whether accidental or suicidal.

1. **Marks of violence** on the body.—All cuts, bruises, or abrasions should be especially examined, as the presence of inflammatory action indicates an injury received sometime before death. Very often such marks are due to accidental injury at the time of immersion, or, but less often, to injury after immersion. Hence, in a case of death from drowning such marks do not indicate homicide, unless from their nature or from the circumstances of the case, the possibility is excluded of their being due to: (*a*) injuries received at the time of immersion, owing to the body striking in its fall against some hard object, or if the fall had been from a great height against the surface of the water. Bodies found in wells frequently exhibit severe injuries caused in the first of these two ways; and fracture and dislocation of the cervical vertebræ have resulted from the head striking forcibly against the bottom of a shallow bath. Again, a case is recorded in which dislocation of both arms backwards was caused by the body after falling from a great height striking the surface of the water with the arms outstretched. (*b*) Injuries received after immersion, during life or after death, *e.g.* a case is reported where a mark of a ligature on the neck was produced by the string of a cloak getting tightly drawn round the neck during the struggles of the drowning person; and another where fracture of one of the cervical vertebræ was caused by the muscular effort of throwing the head violently back on contact of the body with the water. Obviously also severe injuries may result from the body during life or after death being forcibly dashed against some hard object, *e.g.* a rock or wall, or the pier of a bridge; or from the bites of animals.

2. **Ligatures** are found round the hands or feet, or weights are found attached to the body. In such cases accident is contra-indicated. If the ligatures are found tied in such a way that the individual himself could not have tied them (but not unless this is the case) suicide also is contra-indicated.

3. The body is found **in shallow water.**—In this case accident is contra-indicated, unless the individual was intoxicated or insensible at the time of immersion or a child in a tub

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of water. Suicide is not contra-indicated, as cases are known of individuals drowning themselves in water only a few inches deep. If drowning in shallow water is homicidal, marks of violence due to the force employed in holding the victim under water will usually be present. Here it may be mentioned that in some parts of India a form of ordeal to which women suspected of witchcraft are in some instances subjected, is holding the head under water during the time an arrow is shot from a bow and brought back to the place from which it was shot.[1]

Case.—**Weeds in mouth** indicate site of drowning.—The body of a child was found in a tank at a considerable distance from his own house, and suspicion was naturally excited that he had been conveyed thither and made away with. Dissection afforded clear evidence of death from drowning: the fauces, larynx, and trachea contained small portions of green vegetable matter, and the right bronchus was almost completely filled with so large a portion of an aquatic weed, doubled together, that it appeared astonishing how any such body could pass the *rima.* It was afterwards proved distinctly that no weed of the kind grew in the tank where the body was found. Further inquiry led to the discovery that the boy's body had been found by a woman in a tank near his home, in which the weed, lodged in the air passages, grew abundantly. This female had conveyed the corpse to the more distant tank, which belonged to a person against whom she bore a grudge.—Chevers, *Med. Jur.*

For other cases see Appendix VII.

[1] Gribble, *Med. Jur.*, p. 151.

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CHAPTER VIII.

BURNS AND SCALDS.

'BURNS' are injuries produced by the application of flame or heated substances to the body, while 'scalds' result from the application of steam or hot liquid at or near its boiling-point. The effects of burns and scalds are essentially the same. Injuries caused by the application to the surface of the body of corrosive substances, *i.e.* such substances as cause chemical destruction of the tissues, may also, for medico-legal purposes, be classed as burns. The chief medico-legal questions connected with burns and scalds are:—I. Is the injury a burn or scald, and if so, how was it caused? II. Was the injury inflicted during life? III. Was the injury the result of accident, self-inflicted, or inflicted by another? and IV. What results followed, or are likely to follow, from the injury?

I.—Is the Injury a Burn, or Scald, and if so, how was it caused?

A conclusion arrived at in regard to this question may be of importance.

1. By *ss.* 324 and 326 of the Indian Penal Code, the causing of hurt, or grievous hurt, by certain specified means, is made an offence punishable more severely than when such means have not been used. Among the means specified in these two sections are not only what may be called lethal weapons (see pp. 117 *et seq.*), but also "fire or any heated substance," or any "corrosive substance," or "explosive substance."

2. It may affect the question of the guilt or innocence of an accused person. In this respect it may be of much importance to determine, if possible, the precise means whereby the injury, if a burn, was produced, *e.g.* whether produced by the application of a particular heated solid, or of a heated liquid, or by the application of a particular corrosive substance.

Degrees of burns.—For medico-legal purposes, injuries caused by the application of heated substances to the body may be divided into: (1) Burns producing mere redness. (2) Burns causing mere vesication. (3) Burns causing the death of the part injured. And to these three classes may be

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added a fourth, viz. (4) burns caused by the external application of corrosive substances.

(1) **Burns producing mere redness** are usually caused by the momentary application to the part of a hot solid, or of a fluid at a temperature several degrees below the boiling-point of water. They are followed by superficial inflammation, with or without desquamation of the cuticle. Burns of this class may be simulated by the application of various mild irritants to the skin.

(2) **Burns causing vesication** are produced by the application of liquids at a temperature about that of boiling-water; or by the momentary application to the part of a flame, or of a highly heated solid. Burns of this second class, caused by flame or by highly heated solids, may be accompanied by blackening of the skin and scorching of the hair at the seat of injury. In mild burns of this second class, the vesicles simply dry up and heal, and no permanent marks are left. In severe cases, or in unhealthy subjects, suppuration of the vesicles may occur, followed by ulcers, leaving permanent cicatrices. Burns of this second class may be simulated by the application to the skin of various strong irritants, *e.g.* cantharides and tartar emetic. In badly nourished persons vesication of the skin, resembling a burn, may occur without the application of heat.[1]

(3) **Burns causing the death of the part injured** are produced by prolonged contact with flame or with highly heated solids, or by contact with liquids at a temperature considerably above that of boiling water, *e.g.* boiling oils or melted metals. They vary in appearance and degree of gravity, according to the depth to which the injury extends, *e.g.* the death of a portion of the skin only may have been caused (*Dupuytren's 3rd and 4th degrees*); or the underlying soft parts, as well as the skin, may be affected (*Dupuytren's 5th degree*); or an entire limb, bones and all, may be destroyed (*Dupuytren's 6th degree*). Burns of this class often leave sores difficult to heal, or so large in extent as to require the performance of an amputation. They leave permanent cicatrices, which frequently contract considerably, causing by their contraction considerable deformity, or impairment of the use of members or joints. If a burn of this class has been caused by the application of a heated solid, the form of the solid employed may frequently be inferred from the shape of the burn. In burns produced by highly heated solids or liquids, the skin, if moist, may be brought into contact for a short time with substances at a high temperature, *e.g.* red-hot solids or melted metals, without a burn being produced. This depends on the assumption of the spheroidal state by the moisture on the surface of the skin, and as a high temperature is necessary for the production of this spheroidal state, the temperature of the substance brought into contact with the skin must be high, otherwise a burn will be produced.

(4) **Burns caused** by the application of corrosive substances to the body seldom extend deeper than the true skin. Vesication does not accompany burns of this description, and there is no scorching of the hair in the neighbourhood of the burn. Further, if the corrosive substance is, as is commonly the case, a liquid, marks of trickling will usually be found on the clothes of the person injured. The particular corrosive employed may frequently be inferred from the colour of the marks on the skin, or definitely ascertained by chemical examination of the stained portions of clothing (see 'Corrosive Poisons,' Chap. XXII.).

[1] Guy's *For. Med.*, p. 305.

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II.—Was the Injury inflicted during Life?

This question sometimes arises, *e.g.* in cases where, in order to conceal a murder, an attempt is made to burn the body of the murdered person. The chief appearances whereby burns inflicted during life may be distinguished from *post mortem* burns are presence of (1) signs of inflammation; (2) a line of redness; and (3) vesication.

(1) **Signs of inflammation** and reparative action, such as the presence of granulations or pus on the injured surface, indicate that the injury was inflicted some considerable time before death. The absence of such signs, of course, does not indicate that the injury was inflicted after death.

(2) **A line of redness.**—If a burn is inflicted during life, in the great majority of cases, a line of redness almost immediately forms round the injured surface. This line of redness, although it may be surrounded externally by a blush, disappearing on pressure or after death, does not itself disappear on pressure, and remains visible after death has taken place. The presence of a line of redness possessing the above characters is almost certain evidence that the burn was inflicted during life, and conclusive evidence that it was inflicted during life, or within ten minutes after death. Its absence, however, is not positive evidence that the burn was inflicted after death.

(3) **Vesication.**—Here it is convenient to distinguish between what may be called respectively true and false vesication. In true vesication the vesicles contain serum very rich in albumen. In false vesication the vesicles either contain air only, or (especially in dropsical bodies) a small quantity of serum, in which traces only of albumen are present. The presence of true vesication, as the result of a burn, is proof that the injury was inflicted during life. The presence of false vesication, as the result of a burn, shows that the injury was inflicted after death. The entire absence of all vesication is quite consistent with the supposition that the burn was inflicted during life, as the fire continuing after death may dry up the vesicles.

III.—Was the Injury the result of accident, self-inflicted, or inflicted by another?

Accidental cases are so common that the presumption is always in favour of accident. Accidental cases may arise from

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an individual's clothes catching fire, or having heated liquid spilt accidentally over him: or a petroleum lamp breaks, and its oil catches fire and falls on him. Sometimes persons in a state of intoxication fall asleep near a fire and are accidentally burnt to death; and there are also the rare cases of so-called spontaneous combustion. In the majority of accidental cases, examination of the body throws little or no light on the question whether the injury was or was not the result of accident. It may, however, be noted that burns on several distinct and separate portions of the body contra-indicates accident, whilst the discovery of the burned body at the spot where ignition first took place is consistent with the supposition of accident, if the individual was narcotized or insensible at the time ignition occurred. Marks of violence present on the body do not necessarily contra-indicate accident. Such marks may, for example, be due to injuries received prior to, or at the time of, accidental ignition. It must be borne in mind also that sometimes marks closely resembling wounds are produced as the result of a burn.

Suicidal cases are becoming more common as *sati* in India of late (1917) is becoming more popular.

Burns are sometimes self-inflicted in order to support a false charge. Where this is suspected, the question whether or no the injuries correspond in appearance to the alleged method of production must be carefully considered (see *Case* below).

Case.—**False charge of burning.**—"In March, 1865, the assistant magistrate of Howrah sent me a girl about ten years old, for my opinion as to how certain marks on her cheeks, arms, and back were caused. She asserted that they were burned with a hot *chillum* (tobacco-pipe), whereas the accused declared that they had been made with some paint. I found a large circular brown mark on either cheek; each of these marks had a clean and perfectly defined edge. The marks on the arms and back were parallel brown streaks, with clean edges; there was no vesication, but the cuticle was beginning to separate. Such even, clear-edged, symmetrical marks could not have been inflicted with a heated body upon any person who was not in a state of complete insensibility, and from their shape it was evident that they could not have been caused by the application of a *chillum*. I gave it as my opinion that a fluid irritant had been applied, and that the case had been trumped up."—Chevers, *Med. Jur.*, p. 532.

It must be recollected that the application of the actual cautery, or of moxas, or of strong blistering agents, to the body, is a favourite method of treatment among *hakims* in India, and that false charges may be found on burns so produced. The presence also of such burns on a dead body

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may give rise to an erroneous suspicion as to the cause of death.

Homicidal cases, and cases of the infliction of hurt, by burning, are not infrequent in India. Chevers mentions a number of cases, the means employed being, in many of them, the application of heated iron instruments, *e.g.* sickles or ladles or spoons, to the part. In other cases, placing the victim over a fire, applying a lighted torch or a piece of ignited charcoal or a heated pipe-bowl, or pouring heated oil on the body, or covering a portion of the body with tow or rags steeped in oil and setting fire thereto, were the means resorted to.

Case.—**Homicidal scalding.**—Several *darwans* of the Bengal Paper Mills at Raniganj attacked a European assistant, Mr. Ironside, and threw him into a hot-water tank on the 11th July, 1899. The surgeon of Burdwan examined the body on the morning of the 13th, and found bruises on the left side and left shoulder, and marks on the throat and neck, bruises on the chest and severe bruises on the left side of the head above the temple. The *post mortem* examination showed an effusion of blood into the thorax. The immediate cause of death was considered to be immersion in the hot-water tank, the temperature of which was 130°. Deceased died immediately after immersion, as a result of the extreme shock. The severe bruise on the head was caused by some blunt instrument, and may have caused insensibility, but not death. The defence set up was that Mr. Ironside accidentally fell in the tank while running away from the natives, with whom he had quarrelled.

In several of Chevers' cases the victims were females, and the burns were inflicted on the pudenda, as a punishment for suspected adultery. In others the victims were children, the burns being inflicted as a punishment for trifling offences. Chevers also mentions numerous cases of the use by dacoits of torture by fire, for the purpose of extorting information from their victims, as to the place of concealment of money or valuables; and also cases in which thieves, or persons suspected of theft, have been tortured by burning, as a punishment, or in order to extort confession. Again, plunging the arm into boiling oil is a form of ordeal to which women suspected of witchcraft are subjected in some parts of India. Along with homicidal cases may be classed cases where an attempt is made to conceal a murder by burning the body of the murdered person. In such cases nothing but fragments of partially charred bones may be discovered (see *Case* below).

Case.—**Supposed attempt to conceal murder** by burning the body.—In a case forwarded from Sakkar (Sindh) some fragments of partly burnt bones were sent for opinion as to whether the same were or were not fragments of human bones. Several of the fragments forwarded were clearly identified as fragments of the bones of an adult human being. A

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summary of the history of this case is as follows:—Two men started out together, one carrying an axe; after a time one of the two returned, the other seemingly having disappeared. Trackers were placed on the trail made by the two men, and they, on following the trail, came to a place where the double trail ended, and a return single trail began; at this place the fragments or bone sent for examination were found.—Bombay *Chemical Analyser's Report* for 1883, p. 9.

In other cases the soft part may be more or less entire, and then two questions obviously arise, viz. (*a*) Have the burns the character of *post mortem* or *ante-mortem* burns? and (*b*) Does examination of the body reveal a cause for death (or for the occurrence of insensibility) irrespective of the burns? The first of these questions has already been discussed (see *Quest. II.*). In regard to the second question, the only special point to be noted is, that, as already mentioned, injuries resembling to a certain extent wounds caused by mechanical violence may be produced on a body by the action of heat alone.

IV.—What Results followed, or are likely to follow, from the Injury?

For medico-legal purposes in India this question, as in the case of wounds (see p. 168), becomes: Has the injury caused, or is it likely to cause, death; and if not, has it caused one or other of those forms of hurt which are by the law of India designated as 'grievous hurt'? In this regard note:—

1. **Death** may occur from burns (1) Before reaction sets in, *i.e.* within forty-eight hours of the receipt of the injury, from (*a*) shock or collapse; or (*b*) coma, due to congestion of the brain, and serous effusion into the ventricles (this may be mistaken for opium poison). (2) After reaction has set in, from (*c*) various internal inflammations, *e.g.* pneumonia, bronchitis, pleurisy, enteritis. Enteritis with ulceration, followed by peritonitis, is a not infrequent cause of death from burning, especially in young people; (*d*) surgical complications connected with the injury, *e.g.* gangrene, erysipelas, tetanus, pyæmia, etc.; or (*e*) from exhaustion.

2. **The danger to life** in burns depends chiefly on (1) extent of surface injured.—Burns involving a great extent of surface are specially dangerous to life. "A burn involving two-thirds, or even one-half of the entire skin, may be regarded as certain to destroy life, and the same practically may be said

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of a burn (if severe) involving one-third of the body" (Tidy): deep burns involving a limited portion of the body are not nearly so dangerous to life as burns involving a wide extent of surface. (2) part burnt.—Burns on the trunk are more dangerous to life than burns on the extremities, and death before reaction has set in is specially likely to occur in the case of burns involving a wide extent of surface on the trunk. (3) the depth of the burn, and (4) age of the patient.—Children, as a rule, bear burns badly, whilst old people bear them comparatively well (Tidy). **The most fatal period** after a burn is the first week. Erichsen found that in 54 per cent. of fatal cases death occurred within four days, and in 66 per cent. within eight days, after receipt of the injury.

3. **The post mortem** signs of death from burns.—The soft parts may be entirely destroyed, and it may be impossible from the *post mortem* appearances to form any opinion as to whether death was due to burning, or to some other cause operating before cremation of the body. If the soft parts are more or less entire, the *post mortem* appearances present may be: External, viz. marks on the surface of the body, having the characters possessed by burns inflicted during life, and varying in appearance according to the length of time which has elapsed between receipt of the injury and death. If the body is roasted the limbs are usually contracted or flexed; be careful, therefore, in attempting to straighten the limbs, as the roasted skin may crack, and similar 'wounds' may have taken place before your arrival. **Internal.**—Perforating ulcers of the duodenum, resulting from inflammation of Brunner's glands, are common in cases of deaths from burns especially in young children (Curling). Peyer's patches, and the solitary glands generally, are often greatly inflamed and sometimes ulcerated (Tidy); (*c*) Congestion of various organs, *e.g.* the brain, lungs, liver, kidneys, etc.

In making a post mortem examination in a case of alleged death from burns, it must always be borne in mind that death (or insensibility) may have been produced by causes operating previously to the infliction of the burns. Hence, in cases of alleged death from burning, it is extremely important to note: (*a*) Whether or not the burns possess the characters of burns inflicted during life; and (*b*) whether the examination of the body reveals any cause for the occurrence of death (or insensibility) other than burning; and if wounds are present on the body, to note whether they appear to have been caused by the action of fire or not.

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Case.—**Apparent wounds** caused by burning.—A boy, *æt.* two, was brought to hospital severely burnt and died in three-quarters of an hour. There were gaping wounds on both knees. On the right side, a fissure in the skin commenced about the middle of the thigh, and proceeded for two inches and three-quarters to the inside of the patella, or knee-pan, where it became somewhat jagged, and making a sudden turn inwards, passed to the extent of two inches towards the back of the joint. A transverse laceration of the skin, three-quarters of an inch in length, was observed on the front of the left thigh, a little above the knee; and another, which was also transverse and measured an inch and a half, was situated below, on the inner side of the joint. These fissures in the charred skin were all about three lines in width and two in depth, and exposed the fatty tissue beneath, which was white, and free from any effusion of blood. The edges of these fissures were not uneven, but they did not present the clean and smooth appearance usually observed in incised wounds. In several places some small vessels containing blood were observed running across the fissures; these, being more tenacious than the fatty tissue, had not yielded with it. From the absence of any trace of effusion of blood, the sound condition of the exposed adipose tissue, its exemption from the action of fire, and the irregular character and appearance of the fissures, Mr. Curling considered them to have been occasioned by the influence of heat.—Taylor, *Med. Jur.*, p. 715.

4. **'Grievous hurt' may be caused by burns.**—The injuries which, by *s.* 320 of the Indian Penal Code, are designated as 'grievous hurt,' have already been enumerated. Burns are especially likely to cause the following forms of 'grievous hurt':—(*a*) Hurt "*which endangers life, or which causes the sufferer to be, during the space of twenty days, in severe bodily pain or unable to follow his ordinary pursuits.*" It has before been noted that burns involving a wide extent of surface (especially of the trunk) are specially dangerous to life. (*b*) If the burns are on the head or face, especially if the true skin is affected to any depth, "*permanent disfiguration of the head or face*" is likely to result. (*c*) "*Permanent privation of the sight of either eye*" is a not unfrequent result of the throwing of corrosive fluids, *e.g.* oil of vitriol, over the body. (*d*) "*Permanent impairment of the powers of*" a "*member or joint*" is specially likely to occur (from contraction of cicatrices) in the case of severe burns in the neighbourhood of joints.

Spontaneous Combustion.

The question whether the human body is liable to spontaneous combustion has arisen in the following way:—It is well known that in ordinary circumstances long exposure to a high temperature, and the expenditure of a considerable amount of fuel is required in order to cause any considerable amount of charring of a human body. Several cases, however, are on record where the bodies of persons, generally old obese females addicted to spirits, have been found near a fire or partly burned candle, half-consumed, and exhaling a fœtid, empyreumatic odour. In many of these cases, articles near the body have been found

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covered with a greasy, stinking soot, but although combustible, unburnt, indicating that the temperature of combustion has been comparatively low (see *Case*, p. 251).

In order to start the combustion of an inflammable substance, a portion of it—no matter how small—must be raised to a particular temperature. The temperature required varies with the substance. A mass of phosphorus will take fire if any portion of it be raised to the comparatively low temperature of 140° F. Hydrogen, on the other hand, requires a high temperature for its ignition. When a portion of the inflammable substance, or mixture of inflammable substances, is capable of acquiring the temperature necessary for ignition either *per se*, or on contact with air only; such substance, or mixture of substances, is liable to catch fire spontaneously. In such substances, the self-acquirement of the temperature necessary for ignition is the result of the development of heat by chemical action, such chemical action taking place either between the substance and the oxygen of the air, or, in a few cases, between two of the constituents of a mixture. The principal substances liable to spontaneous combustion are:—

1. **Certain simple bodies.**—Phosphorus is the best known example of this class. This substance, in its ordinary condition, oxidizes in air even at a temperature of 50° F., and requires only a comparatively low temperature for ignition; hence, it is peculiarly liable to catch fire spontaneously. Certain of the metals, if in a finely divided condition, *e.g.* iron, are liable to take fire on exposure to air, owing to heat developed by the combination of the metal with oxygen.

2. **Certain compound bodies** take fire at once on exposure to air, *e.g.* silicon hydride, liquid phosphide of hydrogen, and zinc ethyl. The presence of a small quantity of the vapour of liquid phosphide of hydrogen also, it may be remarked, confers the property of spontaneous inflammability on combustible gases.

3. **Certain mixtures of substances** are liable to spontaneous combustion from:—(*a*) The occurrence of chemical action between the constituents of the mixture, *e.g.* phosphorus takes fire on being brought into contact with iodine. Many finely divided metals and paper moistened with turpentine take fire in chlorine. Turpentine takes fire if mixed with fuming nitric acid, etc. Probably the occasional spontaneous combustion of red fire (a mixture of sulphur, carbon, antimony sulphide, potassic chlorate, and strontium nitrate) is due to this cause. (*b*) The oxidation of one of the constituents of the mixture.—The constituent undergoing oxidation may be an inorganic substance, *e.g.* a metallic sulphide. Some varieties of coal contain iron pyrites (sulphide of iron) in considerable quantity, and are liable to spontaneous combustion from heat developed by the combination of this with the oxygen of the air. Again, the constituent undergoing oxidation may be an organic substance, *e.g.* a drying oil. Numerous cases are on record of the spontaneous ignition of fibrous and other combustible substances moistened with a drying oil, *i.e.* an oil capable of drying readily into a resin by taking up oxygen from the air. Cotton, wool, hemp, flax, jute, woody fibre, and lamp-black have all been known to catch fire spontaneously when moistened with linseed or other drying oils. Woody fibre moistened with turpentine has been known to catch fire from a similar action.

Organic matters moistened with water only, *e.g.* damp hay, cotton, tow, flax, cocoanut fibre, leaves, etc., are liable to become heated from oxidation. Spontaneous ignition of damp hay and cotton, and of damp oats and esparto grass, has been known to occur. It may also be

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remarked that certain explosive substances are liable to explode either spontaneously, *e.g.* chloride of nitrogen, or from a very slight amount of percussion or friction, *e.g.* nitro-glycerine, the metallic fulminates, and mixtures of combustible substances with potassic chlorate.

Case.—**So-called 'spontaneous' combustion** of the human body.—In the *Phil. Trans.*, Vol. XLIII. p. 463, it is recorded that "Grace Pett, the wife of a fishmonger at St. Clements, Ipswich, used to go downstairs every night, half dressed, to smoke a pipe. On the 9th of April, 1744, she got up from bed as usual. Her daughter, who slept with her, did not perceive that her mother was absent till next morning when she awoke. Soon after this she put on her clothes, and, going down into the kitchen, found her mother stretched out on her right side, with her head near the grate. The body was extended near the hearth, with the legs on the deal floor, and it had the appearance of a log of wood consumed by a fire without apparent flame. On beholding the spectacle, the girl ran in great haste and poured some water over her mother's body, to extinguish the fire. The fœtid odour and smoke which exhaled from the body almost suffocated some of the neighbours, who had hastened to the girl's assistance. The trunk was in some measure incinerated, and resembled a heap of coals covered with white ashes. The head, the arms, the legs, and the thighs had also participated in the burning. This woman, it is said, *had drunk a large quantity of spirituous liquor*, in consequence of being overjoyed to hear that one of her daughters had returned from Gibraltar. There was no fire in the grate, and the candle had burnt entirely out in the socket of the candlestick, which was close to her. There were also found near the consumed body the clothes of a child and a paper screen, which had sustained no injury. Her dress consisted of a cotton gown."—Woodman and Tidy, *For. Med.*, p. 1010.

Case.—**Spontaneous combustion** put forward as a defence to a charge of murder. "In March, 1850, a man named *Stauff* was tried at Darmstadt for the murder of the *Countess of Gœrilitz*. He had assaulted the deceased in her chamber, and then set fire to the furniture, with a view to conceal his crime. The body and dress were partially consumed. As the means by which the fire was applied were not at once apparent, and the assassin had locked the doors of the room, some medical men took up the theory that the deceased had died from spontaneous combustion. The facts of the case were referred to Professors Liebig and Bischoff, of Giessen, and their report was issued in March, 1850, at which date the man Stauff was put on his trial. They found no difficulty in concluding that a murder had been perpetrated, and the body wilfully *burnt after death*, for the purpose of concealing the crime." Stauff was convicted, and subsequently confessed that he had strangled the countess, and then, heaping articles of furniture around the body, had set fire to them, with the object of concealing the murder.—Taylor, *Manual*, p. 348.

Death from HEAT.

SUNSTROKE, INSOLATION, 'COUP DE SOLEIL,' HEAT-APOPLEXY.

Death from heat seldom becomes the subject of medico-legal inquiry except in cases of sudden death in heated engine-rooms or factories or cases found dead in railway carriages, where there is suspicion of foul play.

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Death from heat may occur in two ways:—

(1) **Heat Exhaustion,** sudden syncope or faintness from exposure to high and usually moist temperature of the air. Patient suddenly feels faint, turns pale, pulse is weak, soft and fluttering, respiration shallow, skin cold, temperature sub-normal.

(2) **Heat-Stroke or Sun-Stroke,** usually by exposure to intense sun-heat. The symptoms may set in suddenly, or there may be premonitory symptoms, such as headache and vomiting. These are followed usually by confusion of vision, flushing of the face, conjunctivæ congested, and stupor or coma. The temperature is invariably high. The pupils are generally dilated in the earlier, and contracted to a fine point in the later, stages. In a few cases delirium and convulsions are present. Death has been known to occur in five minutes, or as late as three days, after the commencement of the attack.

Circumstances modifying the effect on the system of exposure to heat are:—

1. **Moisture** present in the atmosphere.—Other things being equal, the less this is, the better exposure to heat is borne. The presence of a large amount of moisture in the atmosphere interferes with evaporation from the surface of the body, and favours the action of heat on the system.

2. **Duration of exposure.**—Very high temperatures can be borne for a short time, but not for long, without ill-effects. Chabert, 'the Fire King,' was in the habit of entering an oven the temperature of which was from 400° to 600° F.

3. **Habit.**—This appears, to a certain extent, to lessen the effect of exposure to heat. Individuals accustomed to carry on their daily work in an atmosphere of high temperature, apparently withstand the action of heat better than others.

4. **Bodily condition of individual.**—The action of heat on the system is favoured by exhaustion, indulgence in alcoholic liquors, or anything which checks elimination, or embarrasses the normal working of the organic system. In 90 per cent. of cases of Heat-Stroke personally examined in Eastern Bengal and Bombay, Powell has found evidence of (1) malaria, (2) alcoholic excess, or (3) syphilis, sometimes all three in the some case.

Post mortem appearances.—In some cases no abnormal appearance has been present. In the majority of cases, congestion of the brain and its membranes, engorgement of the right side of the heart and congestion of the lungs and abdominal viscera are found. The blood is frequently fluid and dark in colour, hence there is great *post-mortem* lividity and decomposition sets in rapidly.

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Death from COLD.

If, from exposure to cold, the temperature of the human body becomes reduced for any length of time much below the normal, death occurs. In exceptional cases the temperature of the body has been known to fall as low as 79°, or even 75° F., without life being extinguished.

Constitutional symptoms produced by exposure to cold are depression of the heart's action, and torpor, succeeded by stupor or coma, from congestion of the nervous centres. In addition, exposure to cold may produce certain local effects, *e.g.* chilblains or, in severe cases, frost-bite, the part affected becoming, when frost-bitten, bloodless, ash-grey, and insensible. If a part affected with frost-bite is warmed too suddenly, gangrene is apt to set in, hence, warmth should be restored to frost-bitten parts gradually, as, for example, by friction with snow.

Circumstances modifying the action on the system of exposure to cold are :—

1. **Wind.**—Air being a bad conductor of heat, cold still air produces much less harmful effect on the body than cold air in motion, as in a wind.

2. **Moisture.**—If the surface of the body be wet, or covered with wet clothing, and exposed to cold air, heat, owing to evaporation, is withdrawn more rapidly than if the surface of the body be dry.

3. **Duration of exposure.**—Of course the longer the exposure to cold, the more likely are ill effects to occur. Adopting proper precautions, however, an extremely low atmospheric temperature may, as in the case of arctic voyagers, be borne for long periods.

4. **Age.**—Adults bear cold better than the very young and very old.

5. **Bodily condition.**—The action of cold on the system is favoured by anything which tends to lower the vital powers, *e.g.* fatigue, exhaustion, intoxication, want of food, etc.

Post mortem appearances are not very characteristic; they are, according to Ogston :—(*a*) Arterial hue of blood generally, except when viewed in mass within the heart. (*b*) Unusual accumulation of blood on both sides of the heart, and in the large thoracic arteries and veins. (*c*) Irregular diffused dusky-red patches on limited portions of the surface of the body, even in the non-dependent parts. (*d*) Pallor of the surface of the body, accompanied, according to Ogston, with anæmia, but, according to other authorities, with congestion of the viscera most largely supplied with blood. Ogston, however, found moderate congestion of the brain in three, and of the liver in seven, out of sixteen cases.

Death from cold is, as a rule, accidental, as in drunkards falling asleep in the snow or people lost in snowdrifts. Exposure to cold is a common method of infanticide in temperate climates, death taking place rapidly. Cases where insane persons have, it is alleged, been killed by exposure to cold, sometimes form the subject of a medico-legal inquiry. Taylor

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mentions a case where the death of a lunatic appears to have occurred from the combined effect of a shower-bath at 45° F. for half an hour, followed by a full dose of tartar emetic.

Death from LIGHTNING and ELECTRICITY.

Death by lightning with marks of violence on the body which have been attributed to murder sometimes require medico-legal investigation.

The human body is a feeble conductor of electricity; it allows of the passage through it, by conduction, of charges of electricity up to a certain pitch of intensity; but if this be exceeded, discharge taking place through the body becomes of the nature of a disruptive discharge. The passage of a feeble charge of electricity by conduction through the body usually produces no ill-effects. A strong charge—strong enough to kill by shock—may pass through the body by conduction, or at any rate without producing visible separation of its particles; hence, in some cases of death from discharge of electricity, no wounds can be discovered. Very strong charges of electricity discharging through the body usually produce visible wounds. **Heat** may be evidenced by the skin or clothes showing marks of burning; metal articles attached to the clothes, such as buttons, or carried in the pockets, show signs of fusion; and steel articles, a knife for example, are found to have acquired magnetism.

Conditions of lightning stroke.—Lightning stroke has occurred in almost every situation. Thus persons have been struck by lightning in the open, in houses (in one case a boy in bed was struck by lightning), under trees, etc., etc. Not infrequently, of two or three persons standing near one another, one is struck, the others escaping. During a thunderstorm the neighbourhood of a high projecting bad or feeble conductor, such as a solitary tree, is a specially dangerous situation. The projecting object attracts the accumulated electricity, but, being a bad or feeble conductor, opposes such resistance to its passage that lateral discharge takes place into neighbouring objects, *e.g.* into the body of an individual standing near. The neighbourhood of a good conductor, if of insufficient thickness, is dangerous, for a precisely similar reason. Telegraph clerks, for example, have, during thunderstorms, been killed while standing at their instruments, owing to the wires in connection therewith, from their insufficient thickness, opposing so much resistance as to cause lateral discharge. The attraction of projecting objects for electricity necessitates the protection of high buildings by lightning conductors. These are thick rods of copper, one end of which projects above the building, while the other is buried in wet earth. All metal-work on the surface of the building should be in electrical connection with the lightning conductor by thick wires. A peculiar class of cases of death resulting from the discharge of atmospheric electricity are the cases in which individuals are killed by what is called the 'return shock.' In these cases the person killed is sometimes at a considerable distance from the spot where the discharge of lightning takes place. Cases of this kind are explained as follows: A cloud charged with electricity induces a charge of the opposite kind in objects—*e.g.* the bodies of individuals—in its neighbourhood. When the cloud discharges itself, the inducing influence being suddenly withdrawn, these objects suddenly discharge

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their induced charge of electricity. Sometimes this discharge of induced electricity from the body of an individual is so violent as to produce a severe or even fatal shock. In cases of this kind no marks of injury are found on the body of the sufferer.

Death or injury from electricity other than atmospheric electricity.—This is usually by accident. Powerful 'arc' electric lamps (*i.e.* lamps in which the light is produced by disruptive discharge between carbon terminals), require currents of great intensity. Two or three cases have lately been recorded where individuals have been killed by accidentally 'short-circuiting' such currents through their bodies, *e.g.* by grasping the wires conveying the current one in either hand, or by standing on one wire and laying hold of the other, or passers-by near leaks at broken wires on the electric tramway lines in Calcutta and other cities. 'Electrocuting' is the judicial form of execution in the United States of America and some other countries in place of the time-honoured method of hanging.

The effects produced on the body by the passage through it of an electrical discharge may be—(1) Local; (2) Constitutional.

Local effects produced may be burns, blisters, or wounds; or ecchymosed streaks, spots, or patches. Burns and blisters are sometimes the result of the clothes having caught fire, but may occur independently of any ignition of the clothes. The hair is often found singed. If a wound is found it may be lacerated, punctured, or contused in character. Ecchymosed or livid patches, spots or streaks are frequently met with. Sometimes the streaks present a peculiar arborescent appearance. Fractures are rare, but have been found in a few cases (Tidy). No marks whatever may be found on the body, even in fatal cases, in which the clothes have been burned.

(2) **Constitutional** effects produced may be immediate death from shock; or the individual may fall down insensible and die after an interval, varying from a few minutes to several days. In one case death occurred as late as the thirty-third day after the receipt of the injury. If immediate death is not caused, the probabilities appear to be in favour of recovery taking place. In non-fatal cases various nervous affections have been found, *e.g.* paralysis (hemiplegia or paraplegia), loss of sight, hearing, speech, or memory; or there may be no apparent effect beyond the momentary shock if the current is slight.

Signs of death or injury from electricity may be :—

1. **External marks on body.**—The nature of these has been already described. The livid arborescent streaks found on the body in some cases are peculiarly characteristic of death from lightning stroke. The marks present on the body may similate in appearance marks of mechanical violence.

2. **Internal appearances.**—Injury to the brain or its membranes is frequently found. The membranes may be congested or lacerated. The brain may be congested or disorganized. Blood may be found effused on the surface or into the interior of the brain.

3. **Objects on or near the body** may show signs of the passage of electric discharge. The clothes may be found burnt or torn; the boots have sometimes been found burst open. In one case the whole of a man's

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clothes were torn off his body and scattered about. Metal articles attached to the clothes or carried in the pockets may be found fused; and steel articles may be found to have become magnetic. Objects in the neighbourhood of the body may be found to show signs of injury, *e.g.* a wall or building may be found cracked, or shattered and thrown down. Trees may be found split, and combustible objects, especially if dry, may be set on fire, or show marks of burning.

Rigor mortis sets in rapidly and putrefaction may be hastened.

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CHAPTER IX.

DEATH FROM STARVATION.

ACUTE and chronic starvation through deprivation of food have similar symptoms. In acute starvation death takes place usually in ten to twelve days, accompanied by mania and convulsions.

The essential nutritive constituents of food are: (1) Albuminates, (2) Carbohydrates, (3) Fats, and (4) Salts. In order to maintain health and strength, a certain amount of each of these, plus a certain amount of water, must be daily supplied. Of the essential nutritive constituents of food the albuminates, *e.g.* albumen and casein, contain both carbon and nitrogen. The carbohydrates, *e.g.* starch and sugar, contain carbon but no nitrogen. The fats, like the carbohydrates, contain no nitrogen, they, however, contain a larger percentage of carbon than the carbohydrates. For convenience, we may call the nitrogen contained in albuminates nutritive nitrogen, and the carbon contained in albuminates carbohydrates, and fats nutritive carbon.

The daily food requirements depend (*a*) on the weight (in health) of the individual to be fed; (*b*) on the amount of work performed; and (*c*) on the age of the individual (children require more food in proportion to their weight than adults, seeing that in their case growth as well as nutrition must be provided for). An adult requires daily if at rest 25 grains, or if at work about 30 to 45 or 50 grains (according to the amount of work done) of nutritive carbon per 1 lb. of body weight. With this amount of carbon, nutritive nitrogen must be supplied in amount equal to one-fifteenth to one-twentieth of the weight of the carbon. The food must contain fat in a certain amount, say about 1 to 3 ounces per diem. The food must contain salts in a certain amount, *e.g.* phosphates, required for the nutrition of the body; also a certain amount of common salt, say ¼ to ½ an ounce; water, 3 to 6 pints daily, and condiments. The food should be varied in character, of good quality, properly cooked, and the intervals between meals should not be too long.

A rough rule for calculating the daily food requirements of adult natives of India is as follows:—Given (*a*) that the food consists solely of cereals and pulses fairly free from husk, and that the dietary contains a sufficiency of fat, and (*b*) that the amount of nutritive nitrogen in the dietary equals about one-twentieth of the carbon, then the number of ounces of food daily supplied must be not less than the average body weight in pounds of the individuals to be fed, multiplied by:—For bare subsistence, 0·16. For light work, say not over 1 foot-ton per 1 lb. of body weight, 0·21. For moderate work, say not over 2 foot-tons per 1 lb. of body weight, 0·26. For hard work, say up to 3 foot-tons per 1 lb. of body weight, 0·31.

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Rapidity with which ill-effects follow deficient supply of nourishment is affected by—

1. **Age.**—Old persons bear deprivation of food better than adults, and adults bear it better than children.

2. **Condition of body.**—Fat people bear deprivation of food best. Diminished activity of the vital functions (as in catalepsy) delays the occurrence of ill effects from deprivation of food.

3. **Exposure to cold.**—Where the loss of heat from the surface of the body is rapid, the effects resulting from a deficient supply of the matters (food) required to maintain the normal temperature are more quickly felt than when the loss of heat from the surface is slow.

4. **Deprivation of water.**—Complete abstinence from both food and water kills more rapidly than abstinence from food alone. Taylor[1] states that it is probable, that in a healthy person under perfect abstinence (from both water and food), death would not commonly take place in a shorter period than a week or ten days. Guy[2] mentions a case of shipwreck where, of eighteen persons deprived of food and water, only one survived the eighteenth day. Where the abstinence is from food only, an individual may survive for a much longer period. Thus a case is recorded of a madman who survived forty-seven days, and another of survival for sixty-one days; in the first of these two cases water only was taken, in the second water and a little orange-juice.

Symptoms of starvation.—The chief:—

1. **Emaciation, loss of weight.**—The subcutaneous fat disappears and the muscles waste; so that the skin of the face becomes wrinkled, and that of the body, especially in previously plump persons, becomes baggy. Chossat, from a series of experiments on animals, found, as a rule, death to occur when the animal had lost two-fifths of its weight. Observation seems to indicate that this rule holds fairly good in the case of human beings.

2. **Exhaustion and weakening of voice.**

3. **Pallor and cadaverous look.**

4. **Thirst,** pain and irritation of the stomach, and usually a costive condition of the bowels. The outlets of the body are frequently found inflamed.

5. **Pulse** is at first quickened, but subsequently becomes slow. It usually, however, becomes greatly quickened on the approach of danger. —Tidy.

6. **In chronic cases especially, the skin** frequently becomes covered with "a brown filthy-looking coating," and the body emits a fœtid odour. "The gums become swollen and ulcerated, and there is great tendency to ulceration and sloughing on the receipt of slight injuries."—Cornish.

7. **Wild-looking** eyes, delirium and convulsions in some cases precede death, in other cases the mind remains unaffected.

Post mortem appearances.—These are chiefly great emaciation, a shrunken and contracted condition of the stomach and intestines with pale pearly and translucent coats, a more or less atrophied condition of

[1] *Med. Jur.*, II. 139. [2] *For. Med.*, p. 312.

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the viscera, and absence—not necessarily complete in acute cases (see *Case* below)—of fat. It should be noted, however, that all these appearances may be present in death from exhausting diseases. Hence in cases of death from alleged homicidal starvation, the body should be carefully examined for appearances indicating the existence of such diseases. It may, in such cases, be an extremely difficult matter to form a definite opinion as to whether death was due to disease or starvation (for a case in which this question arose, see below).

Case.—**Prolonged sleep with starvation.**—A man of healthy habits, 43 years of age, was at intervals subject to attacks of long and persistent sleep. He would retire to bed at his usual hour, and without any warning symptoms, suddenly and almost immediately fall into a profound sleep, from which all the usual means would fail to arouse him. In this state his face and ears were pale; the skin was pale, and generally warm, but his feet were cold and livid, and the limbs quite relaxed. His pulse was soft, slow, and feeble; his respirations almost imperceptible, about eight or nine in a minute. He appeared like a person in a refreshing, tranquil slumber. There was no stertor or snoring. The longest period he ever passed in profound sleep was five days and five nights. He frequently slept three days, and occasionally four days, without waking, but his average period was two days. His secretions were suppressed, and no food was required. He commonly awoke suddenly, had no consciousness of the lapse of time, and retained a good remembrance of the last occurrences before he fell into this state. He had no dreams.—Taylor, *Med. Jur.*, I. 43.

Case.—**Homicidal starvation.**—Death from disease set up as a defence.—Deceased, Harriet Staunton, had been kept in close confinement by the accused. She was seen, a few hours before her death, by a medical man, and was then insensible and collapsed. She died in a state of complete exhaustion. On *post mortem* examination appearances indicative of death from starvation were found, the body-weight being only 74 lbs. instead of about 120 lbs., as it would have been in a healthy adult of the same age. The following *post mortem* appearances of disease were present:—(1) A slight tubercular deposit at the apex of the left lung. (2) A congested appearance of the cardiac extremity of the stomach, as well as of the duodenum. (3) Two small patches of miliary tubercular deposit (recent) upon the arachnoid on the upper surface of the left cerebral hemisphere. There were no traces of meningitis, or of disease of the brain. In this case the defence was set up that death was the result of disease. The medical men who examined the body were of opinion that death was due to starvation. Three of the four accused were convicted.—*Reg.* v. *Staunton*, Taylor's *Manual*, p. 469.

Starvation may be accidental, homicidal, or suicidal.—The most common causes of accidental starvation are:—(1) Shipwreck; (2) Mining accidents—individuals by a fall of earth getting shut up in a mine; (3) Disease, *e.g.* stricture of the œsophagus; and (4) Famine.

In Homicidal cases the victim is usually an infant or child. The withholding of food, with or without exposure to cold, is a not infrequent method of infanticide (see 'Infanticide'). Cases also are not infrequent where children have

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been starved by their parents or other persons having charge of them,—'baby-farmers.' In fatal cases of this kind, as already pointed out, the body should be carefully examined for signs of disease, especially chronic wasting disease. In non-fatal cases, an unusually low body-weight, coupled with a rapid gain in weight when proper nourishment is administered, is very strong evidence in favour of starvation (see *Case* below). As already pointed out under Suffocation, in one form of *samadh*, or burial alive of lepers, the head is left uncovered, and death takes place from exhaustion, the result of starvation and exposure; and not —as in cases where the burial is complete—from suffocation. Suicidal cases are rare, but are sometimes met with, especially in the insane and prisoners who sometimes attempt to commit suicide by starving themselves.

Case.—**Starvation**; rapid gain of weight under proper feeding.—Prisoner charged with starving his servant, *æt.* 13½ years. The girl weighed thirty-five pounds. She suffered, in the cold weather, from chilblains and sloughing of the toes. When removed and properly fed she recovered her health, and gained weight at the rate of five ounces per diem for 129 days.—Tidy, *Leg. Med.*, I. p. 603; *Lancet*, August 14, 1880.

Case.—**Manslaughter by starvation in charlatan's "cure."**—At Worthing, in 1920, L. M. H., a single woman, aged 46, died under a "cure" by a "cure specialist," W. Aird and a nurse, in which the "cure" consisted of an exclusive diet of raw fruit and raw vegetables. Her body was in a state of complete emaciation, and the *post mortem* showed that death was due to acute pneumonia supervening on chronic tuberculosis. The jury found that death was due to the starvation diet, and returned a verdict of manslaughter against the "cure specialist" and nurse.—*Daily Express* (Lond.), May 27, 1920.

Pretended fasting.—Cases are on record where individuals, as a rule hysterical girls or young women, have pretended to an ability to abstain for long periods from food. A medical man should in such cases be cautious about undertaking the duty of watching the impostor with a view to detection, as if death results he may be held criminally responsible. In the case of the Welsh fasting-girl, the medical men who had accepted the responsibility of superintending the watching were indicted before the magistrates along with the parents of the girl; the parents only, however, were committed for trial.

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SEXUAL CRIMES AND OFFENCES AND RELATIONSHIPS.

Sexual crimes and offences and relationships may conveniently be classed under the heads of: (1) *Impotence and Sterility;* (2) *Virginity and Defloration;* (3) *Pregnancy and Legitimacy;* (4) *Birth and Delivery* re *Inheritance;* (5) *Rape;* (6) *Abortion and Fœticide;* (7) *Criminal Infanticide; and* (8) *Unnatural Sexual Crimes. The means of identifying sex in doubtful cases has already been considered* (pp. 35, etc.).

CHAPTER X.

IMPOTENCE AND STERILITY. वन्ध्यता

SEXUAL capacity is a question that may arise with reference to marriage, charges of rape, etc.

Marriage, according to the law of England, is a contract which may be declared null and void by the court on proof that either of the parties thereto is incapable of fulfilling its terms, *i.e.* of consummating the marriage. Hence a suit for the declaration of nullity of marriage may be brought by one of the parties to the contract on the ground that the other is impotent or incapable of sexual intercourse. To obtain a decree declaring the marriage null and void on this ground it must, however, be proved: (*a*) that the incapacity existed at the time of the marriage; and (*b*) that it is of such a nature as to be incurable, or only curable by an operation to which the individual refuses to submit (see *Case*, p. 264). A marriage may also be declared null and void on the ground of insanity of one of the parties thereto at the time of the marriage (see 'Insanity'); and a "breach of promise of marriage" is justified in law by the discovery that the woman is suffering from tuberculosis (see *Case* below).

Case.—**Disease and breach of promise.**—"If a man knows that a woman is suffering from tuberculosis he is justified in breaking off his

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engagement to marry her." This ruling was made by Mr. Justice Lush in the King's Bench Division in an action for breach of promise by Miss M. P. against Mr. G. B., the son of a doctor at Newport, Monmouth. —*Daily Express* (Lond.), April 6, 1919.

'Impotence' is the incapacity for performing the sexual act and **'sterility'** may exist in either sex, but the existence of one of these conditions does not necessarily imply the existence of the other, *e.g.* an individual may be sterile, but not impotent; or impotent, but not sterile. Sterility by itself offers no legal ground for a divorce while impotence may do so. In practice the two disabilities resolve into impotence in the male and sterility in the female. The question of the impotence of an individual may arise in (1) nullity of marriage suits; (2) rape cases, where impotence may be pleaded as a defence by the accused (see 'Rape,' Chap. XIV.), and similarly, in other cases, impotence may be set up as an answer to a charge of adultery; (3) cases of disputed right to inherit (see this subject), where an individual is alleged to be an illegitimate, or a supposititious child—here both Sterility and Impotence come in; also in (4) cases where, under certain circumstances, a woman seeks to have absolute control given to her over money, on the ground that she has no children, and is past the age of child-bearing.

Recorded instances of capability of reproduction in very advanced life are: Cato the censor, who is said to have had a son at eighty years of age; Zadisiäs, king of Poland, at the age of ninety married his second wife and had two sons. As a fact spermatozoa can often be detected in the testicles of very old men; Duplay discovered them in nine octogenarians.

In the male.

A male may be impotent or sterile or both, owing to (1) extreme youth; (2) advanced age; (3) malformation or defect; (4) disease; (5) mental causes; (6) drugs.

(1) **Extreme youth.**—According to the law of England, the earliest age at which a male can contract a valid marriage is fourteen; and a male under the age of fourteen is held incapable of committing a rape. It appears, therefore, to be a presumption of English law that a boy does not attain puberty and become potent for coitus until he has reached the age of fourteen. The law of India contains no similar presumption; a boy under the age of seven is (*I. P. Code*, s. 82) held to be incapable of committing rape or any other offence. Over that

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age, the question of his capacity to commit rape is a question left to the courts to decide according to the evidence produced in the case. The age at which males attain puberty, and become soon capable of performing sexual intercourse, varies. The general age among Europeans is probably about fourteen, and among natives of India somewhat earlier. In exceptional cases puberty is attained at a very early age. Tidy mentions a case of a boy who was given to masturbation from the age of three, and of another boy aged four and a half, who attempted intercourse with his sister aged two.[1] In other cases puberty is not attained until a comparatively late age. Taylor mentions a case of a man whose penis and testicles at the age of twenty-six "but little exceeded in size those of a youth of eight years of age." This individual married, became the father of a family, and at the age of twenty-eight the organs became fully developed.[2]

Attainment of puberty and potency does not, however, necessarily imply coincident attainment of fertility. Until spermatozoa appear in the seminal fluid, an individual is sterile. Casper considers that the power of procreation commences later (and ceases earlier) than the capacity for coitus. Taylor gives fourteen as the earliest age at which the procreative power has been recorded to appear in the male.[3] Aspermatism can be detected by the microscope.

(2) **Advanced age** may of course be a cause of impotence or sterility in the male. Cases, however, are recorded of the procreation of children by men of seventy-one, eighty-one, and ninety-two; and spermatozoa have in several cases been found in the seminal fluid (indicating fertility) of men over ninety.[4] Casper once found them in a man aged ninety-six.[5] In English law there is no age from fourteen upwards at which a man is denied the power of procreating children.

(3) **Malformation or defect.**—Impregnation may result from the mere deposition of semen within the vulva.[6] No malformation or defect of the penis, therefore, can be regarded as an undoubted cause of impotence, unless it is of such a nature as to completely prevent such deposition. This being so, impotence results from complete loss or absence of the penis, or from its orifice being situated, as in complete hypospadias or epispadias, in such a position that deposition of

[1] Tidy, *Leg. Med.*, II. p. 77.
[2] Taylor, *Med. Jur.*, II. p. 290.
[3] *Ibid.*, p. 285.
[4] *Ibid.*, p. 291.
[5] Casper, II. pp. 258, 291.
[6] Tidy, *Leg. Med.*, II. p. 14.

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semen within the vulva during coitus is impossible. Impotence has thus resulted from perinæal fistula. For the reason above mentioned, impotence is not necessarily the result of partial absence or loss of the penis, or of partial hypospadias or epispadias. Adhesion of the penis to the scrotum or abdomen may cause impotence remediable by a slight operation. Individuals impotent from malformation or defect of the penis are not necessarily sterile, it being possible to effect impregnation by artificial injection of the seminal fluid.

Loss of both testicles, or absence of both testicles, of course involves impotence and sterility. The power of procreation may, however, remain for a limited period after the removal of both testicles, owing to presence of accumulated seminal fluid in the vesiculæ seminales. Loss of one testicle only does not result in impotence, nor are those who have one testicle only (*monorchids*) impotent (see *Case* below). Individuals in whom the testicles have not descended (*cryptorchids*) are not necessarily impotent; many, but not all, are, however, sterile (see *Cases* below, and over page).

Case.—**A nullity of marriage case.**—In the case of *L.* v. *L.*, it appeared that the woman was impotent, but that she might possibly be cured by an operation involving no great risk of life, to which, however, she refused to submit. The court, in granting the decree, said that it could not compel her to submit, and the man can only be expected to take all reasonable means to persuade her. This he has done, and she has distinctly refused (L. R. 7 P. Div. 16).—Tidy's *Leg. Med.*, II. p. 102.

Case.—**Procreation by cryptorchid.**—A man in whom the testicles had not descended at the age of 30, had been twice married, and had had children by each wife, besides illegitimate children which were affiliated on him during the time he lived in service.—Taylor, *Med. Jur.*, II. p. 288.

Case.—**A similar case.**—Case of a man in whom the testicles had not descended, reported by Mr. Poland. This man married when he was 20, had two children by his first wife; and at the time of his admission into hospital (for hernia) had been married two years to a second wife.—*Ibid.*

Case.—**Procreation by a monorchid.**—"Willimet, the first wife of one John Bury, alleged that he was impotent; and on inspection by two physicians, he was found to have but one testicle, the size of a small bean, while she was a virgin. On this and other circumstantial evidence, the Ecclesiastical Court annulled the marriage. But Bury took a second wife, by whom he had a son."—Case of John Bury, temp. Queen Elizabeth, Guy, *For. Med.*, p. 48.

(4) **Disease.**—Local disease may cause temporary and remediable impotence; *e.g.* elephantiasis and large hydrocele, from mechanical obstacle to coition; and stricture of the

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uretha, from mechanical obstruction to the flow of semen. Local disease may also cause permanent and incurable sterility, *e.g.* advanced disease of the testicles, or wasting of the testicles after inflammation; this last has been observed as a result of metastatic parotitis. Lithotomy has been known to cause sterility, probably from injury to the ejaculatory ducts.

Constitutional diseases, if of an exhausting nature, may produce temporary impotence; but general diseases, not affecting the brain or spinal cord, or not producing great debility, do not usually cause impotence.[1] Injury or disease of the brain or spinal cord may cause impotence or sterility. Curling relates several cases of impotence caused by blows on the head, especially on the back and under-part of it; in some cases of this class recovery takes place, but in others wasting of the testicles and permanent sterility follows.[2] Paraplegia from injury to or disease of the cord, according to Curling (and probably also locomotor ataxy) has no direct effect on the testicles, but may cause impotence by destroying the power to copulate. Wasting of the testicles and sterility may, however, follow. In one case quoted by Curling, a man suffering from paraplegia of some years' duration retained sufficient sexual power to have prolific intercourse. Hemiplegia may cause impotence, but Guy mentions two cases where men, within three weeks of an attack of hemiplegia, had sexual intercourse with their wives and begat children[3] (see *Case* below). Over-indulgence in certain intoxicating or narcotic drugs, *e.g.* alcohol, opium, cannabis, and tobacco, is said to cause sterility. Sterility has by some men been stated to occur in chronic lead-poisoning.

Case.—*Bagot* v. *Bagot* (Irish Probate Court, 1878), Dr. Radcliffe stated that he himself has seen cases of ataxy in which sexual capacity and fruitfulness were retained.—Guy, *For. Med.*, p. 49.

Case.—**Procreation after** an attack of hemiplegia.—"E. K., *æt.* 58, when 33 years of age, had a well-marked attack of hemiplegia of the right side, which has left him lame, and with his speech slightly affected. He alleges that he had connection with his wife within a week of his seizure, that his sexual powers have not been impaired, and that since his attack he has had three children always considered as his own. His wife gives three weeks as the extreme limit of time after the attack, at which connection took place."—Guy, *For. Med.*, p. 50.

(5) **Mental causes.**—Excess of passion, timidity, fear, etc., may cause temporary impotence. Individuals may, it is

[1] Taylor, *Med. Jour.*, II. p. 292.
[2] *Ibid.*, p. 294.
[3] *For. Med.*, p. 49.

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alleged, be impotent or sterile as regards a particular female, but not as regards others (see *Cases* below).

Case.—**Alleged impotence** in respect to one female, but not to others.—" In the reign of King James I. of England, the Earl of Essex was sued by his Countess for divorce on the ground that he was impotent. She claimed to be a *virgo intacta*, but is said to have substituted one of her maids for herself when examined. The Earl appears to have admitted the charge as regards the Countess, although he denied it *quoad* others." —Woodman and Tidy, *For. Med.*, p. 679, from Hargraves' *State Trials*, I. p. 315.

(6) **Drugs.**—Diuretics, carbonate of soda, etc., have a marked anaphrodisiac action. Quinine, by causing emissions, has a reputation for tending to impotence.

Sterility in the Female.

A female may be sterile owing to (1) extreme youth; (2) advanced age; (3) malformation or defect; (4) disease.

(1) **Extreme youth.**—According to the law of England twelve is the earliest age at which a female can contract a valid marriage; it would therefore appear that the law of England presumes that a girl attains puberty and becomes potent at the age of twelve, though she cannot give her consent to the sexual act till she is sixteen years of age. Age of Consent in India.—According to the law of India (*P. Code*, s. 375), any female over the age of twelve can give a valid consent to sexual intercourse; and "sexual intercourse by a man with his own wife, the wife not being under twelve years of age, is not rape." Hence it would appear that the law of India presumes that a female attains puberty and becomes potent at the age of twelve.

Commencement of Fertility is, as a rule, indicated by the commencement of menstruation. In a few cases, however, pregnancy has occurred before the appearance of menstruation, but no case of pregnancy at an earlier age than eight to nine has been recorded. Menstruation is not a sign of bodily maturity, it is in most cases merely a sign of puberty and ovulation with possible pregnability or capacity to conceive.

The **age** at which the menstrual function becomes established varies greatly with the individual and climate. Among natives of Europe the general age at which it first appears is fourteen to fifteen. Out of 2000 cases, menstruation appeared in 211 between the ages of ten and twelve, in 1462 between

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thirteen and sixteen, and in 318 between seventeen and twenty. In one case only did it appear as early as nine, and in one only as late as twenty-two. Among natives of warm climates menstruation occurs earlier than among natives of temperate climates. Among natives of India menstruation so early as ten is uncommon, but its appearance is seldom delayed beyond the fifteenth year. The menstrual flow commonly lasts three to four and a half days. The menstrual period, reckoned from commencement of flow to commencement of flow, save in exceptional cases, is twenty-eight days.

The influence of Tropical Climate in causing early menstruation seems to have been over-estimated. In the following table are given the comparative results of observations at Calcutta in 3189 cases amongst European, Eurasian, and Indian-born girls as to the age at which menstruation first appeared. In the class of pure native Hindus and Mohammedans, but chiefly the former, the greatest percentage of dates for first menstruation occurs between the 12th and 14th years, amounting to 65·7 of the whole class. Eurasians approach the native type between the ages of 12 to 14 years, but diverge again towards the European type between 14 to 16 years of age.

Ages of First Menstruation in India in Years.

Race		10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Europeans ..	174	2·7	6·1	13·4	23·4	21·2	16·7	8·3	6·1	1·6
European, country-born	387	0·7	3·6	10·8	25·8	24·8	17·3	12·4	3·1	1·2
Eurasians ..	795	0·7	0·2	22·0	31·8	22·0	10·5	4·2	1·7	0·6
Natives	1752	2·0	10·4	36·4	29·3	13·9	4·5	2·2	0·2	0·04
Jewesses	73	—	2·7	9·5	34·2	34·2	17·8	1·3	1·3	—
Chinese	8	—	—	12·5	62·5	12·5	—	12·5	—	—
Total ..	3189	—	—	—	—	—	—	—	—	—

The cause of the earlier menstruation in hot climates seems partly due to the shorter duration of life, with its consequent earlier maturity, and partly to the *social* differences, whereby in the tropics, children early gain precocious knowledge of sexual matters, owing to the want of privacy in oriental domestic life. Thus an experienced observer states that it is doubtful "if there are any little boys and girls in native houses

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in this country who have reached the age of ten years who do not have a very fair knowledge of what the sexual relations and child-bearing really mean." In addition, there is the precocious sexual excitement of too early marriages at the age of ten to twelve years, with its many possibilities of sexual intercourse, authorized by native customs, though now made illegal by British law.

(2) **Advanced age and Cessation of Menstruation.**—Menstruation usually ceases between the ages of forty and fifty, but has been known to cease as early as twenty-three. On the other hand, there are on record several cases of menstruation at over sixty years of age, and one as late as seventy-seven. As a rule fertility ceases with the cessation of menstruation, but Taylor[1] mentions a case of a lady aged forty-four who was delivered of her tenth child eighteen months after the entire cessation of the menses. No general rule can be laid down as to the age at which, in the female, fertility ceases.

The question whether a woman is past child-bearing is of practical importance in cases where money has been settled on or bequeathed to a woman absolutely, in case she has no children, but in case of having children, only for her life with remainder to her children. In these and similar cases, where the woman has attained an advanced age without having had children, it is presumed she is incapable of having issue, and she is held absolutely entitled to the money, in which, if she had children, she would only have a life interest. No particular age is fixed as the period when such presumption arises.

The earliest age on which such a presumption has been acted on is that of a woman aged forty-nine years and nine months (see *In re Millner's Estate*, L. R. 14 Eq., p. 245), but in that case she had been married for twenty-six years and there had never been any children. In the case of *In re Widdow's Trusts* (L. R. 11 Eq., p. 408) the presumption was acted on in the case of a widow aged fifty-five years and four months, and a spinster aged fifty-three years and nine months. In *Norton* v. *May* (9 Ch. Div., p. 388) the court refused to presume no possibility of issue in the case of a woman aged fifty-four years and six months, who, although she had been married several years, had separated from her husband soon after her marriage, and had only lived with him for about three years before the filing of the case in court. In *Davidson* v. *Kimpton* (18 Ch. Div., p. 213), the presumption was acted on in the case of a spinster in her fifty-fifth year. There is no similar presumption as to a male being incapable of begetting issue.

(3) **Malformation or defect.**—Complete absence or occlusion of the vagina of course causes impotence. Occlusion may

[1] *Med. Jur.*, Vol. II. p. 17.

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be remediable by operation. For occlusion to act as a cause of sterility it must be complete; "the slightest aperture will often suffice for impregnation."[1] Many cases are recorded where during labour the vagina has been found occluded to so great an extent as to require incision in order to effect delivery. Ogston mentions a case of "a woman who had a vagina so narrow as scarcely to admit a quill," but who, after being married eleven years, became pregnant, when the vagina "dilated of itself sufficiently to admit of delivery at the full term."[2] Absence of the ovaries or uterus of course causes incurable sterility. In such cases, however, there may be no external defect or malformation, and the cause of the sterility may in consequence only be ascertainable after death.

(4) **Disease.**—Impotence or sterility in the female may arise from a variety of diseased conditions. There may, for example, be excessive irritability of the vagina, preventing coitus and causing impotence (see *Cases* below). Again, effective coitus may be prevented by ruptured perinæum, or recto-vaginal fistula. Sterility may result from disease of the ovaries; obstruction of the Fallopian tubes, or of the neck of the uterus; displacements of the uterus, etc., etc. Acid discharges from the vagina or uterus may cause sterility by acting destructively on the spermatozoa, or preventing their access to the ovum. Paraplegia in the female, it may be noted, does not always prevent either impregnation or delivery.[3]

Case.—**Hysteria a cause** of impotence in the female.—"In this case, where the parties had cohabited for two years and ten months, and the man's capacity and desire to consummate were not questioned, the court being satisfied of the *bona fides* of the suit, and of the practical impossibility of consummation in consequence of the hysteria of the woman, pronounced a decree of nullity, although there was no structural defect in the woman."—Tidy, *Leg. Med.*, II. p. 102, *G.* v. *G.*, L. R. 2 P. & D. p. 287.

Case.—**A similar case.**—"In a suit for nullity of marriage, it appeared from the husband's evidence that whenever he attempted to have intercourse with his wife the act had produced hysteria on her part; and that, although he had cohabited with her for more than three years, the marriage had never been consummated. The wife refused to submit to inspection. Decree *nisi* granted."—Tidy, *Leg. Med.*, II. p. 103. Case of *H.* v. *P.*, L. R. 3 P. & D. p. 126.

[1] Taylor, *Med. Jur.*, I. p. 302.
[2] *Lect. Med. Jur.*, p. 85.
[3] Woodman and Tidy, *For. Med.*, p. 684.

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CHAPTER XI.

VIRGINITY AND DEFLORATION.

ONE of the questions which may arise in nullity of marriage suits is as to whether a certain female is '*virgo intacta*' or not. The same question may also arise in other cases, *e.g.* (1) in divorce cases and defamation cases; (2) in cases where an unmarried female is alleged to be a prostitute, and as such liable to be dealt with under the Contagious Diseases Act, or other similar law (see *Case* below); (3) In rape cases. In these latter, however, it is not an essential question, seeing that vulval penetration is all that is necessary to constitute the offence of rape (see 'Rape'), and this may be effected without destruction of the signs of virginity. (See Figs. 22 to 25, pp. 272–3.)

Case.—**Two women** afterwards found to be prostitutes; result of examination as to virginity doubtful in the case of one.—Two young women, of genteel appearance, were attacked in the public streets by some young men, who called them opprobrious names, and told the passers-by that they were no better than common prostitutes. Some good-natured persons resented this conduct and took the girls' part, and a complaint was lodged on their behalf against their defamers, who were summoned before a magistrate. The defendants pleaded a justification, while the females, on the contrary, stoutly insisted on their purity, and even offered to submit to inspection by a medical examiner, which the opposite party dared them to do. A sworn inspector, clever and conscientious, was appointed by the magistrate, and reported that it was totally out of his power to say anything certain as to one of the females; she might or might not be a virgin; but that the other had probably had some intercourse with men, though he could not assert the fact positively. Yet it subsequently came out that these young women had actually been for some time on the registers of the police, and had both had repeated attacks of the venereal disease.—Guy, *For. Med.*, p. 56, quoted from Parent-Duchatelet.

1. **The Hymen.**—The most reliable sign of virginity is an intact hymen.

(1) *Is the hymen always present?*—At one time it was alleged by many authorities that the hymen was frequently absent. This view has, however, been proved by later observations to be erroneous. It was found, for example, to be present in each one of the 650 cases examined by Devilliers, Orfila,

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and Tardieu.[1] Capuron, however, records a case of congenital malformation of the genitals with absence of the hymen.[2]

(2) *What is the natural condition of the hymen in the virgin?* —Practitioners often have the most vague conception of the hymen and mistake for it the thin margin of the fourchette. Powell's practical directions for its examination are given in Appendix VIII. A very common form of the membrane, after the age of infancy especially, is that of an irregularly circular diaphragm, broken at its upper third by an opening more or less large and placed more or less distant from the lower border of the vaginal orifice. In a third set of cases the hymen has been described in late observations as a sort of diaphragm, exactly and regularly circular, pierced by a central opening. A fourth form assumed by it, and that its most common appearance, is that of a semicircular fold of integument stretched across the lower border of the vaginal orifice, its free border concave and notched (*échancré*), and its extremities losing themselves in the labia minora. Lastly, the hymen has been occasionally encountered in the shape of a mere narrow fringe around the entrance to the canal of the vagina; in one case as a sort of bridle across the vagina, with a passage on each side; in another as a complete septum, pierced by numerous minute openings; and in a third instance as a double septum, without any opening whatever into the vagina. The entrance to the vagina is thus practically closed or narrowed by the hymen, which in early life is most usually vertical, but by the natural development of the parts gradually assumes a horizontal direction. Towards puberty more firm and consistent than in early life, as menstruation becomes established it becomes more or less flaccid, presenting less resistance to their flow, and is more easily lacerated.

(3) *What changes are produced* in the hymen by sexual intercourse?—As a general rule, when sexual intercourse takes place, the hymen is lacerated or ruptured, in the latter case giving rise to "those small pyramidal tubercles, from three to six in number, known as the carunculæ myrtiformes."[3] If, however, the aperture in the hymen be larger than usual, or the membrane itself be lax, repeated intercourse may take place without rupture or even laceration. Many cases are recorded, in fact, where the hymen has existed all through pregnancy, and has only ruptured at the time of delivery. In very young children the hymen, owing to its deeply seated position, and to the narrowness of the parts,[4] is not usually even lacerated by intercourse.

[1] Ogston, *Lect. Med. Jur.*, p. 102.
[2] Tidy, *Leg. Med.*, II. p. 97.
[3] Guy, *For. Med.*, p. 55.
[4] *Leg. Med.*, II. p. 201.

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Case.—**Hymen is present,** and apparently intact, in prostitutes, etc. —At Martineau's service in the Broca (then Lourcine) Hospital in Paris, I saw a girl who had come to the out-patient department for treatment of what was to all seeming an insignificant leucorrhœa. There was no obvious urethritis, nor were Skene's tubules affected, a point to which Martineau used to pay particular attention, and there was present a hymen whose orifice was barely two millimetres in diameter. But this girl was suffering from gonorrhœa, and admitted that she had infected several of her customers, she being a clandestine prostitute of the purlieus of the Sorbonne. She had been on the town for over a year, and had entertained as many as five men in a single afternoon on a *fête* day. Her hymen was elastic, and admitted of the passage of a large rectal bougie,

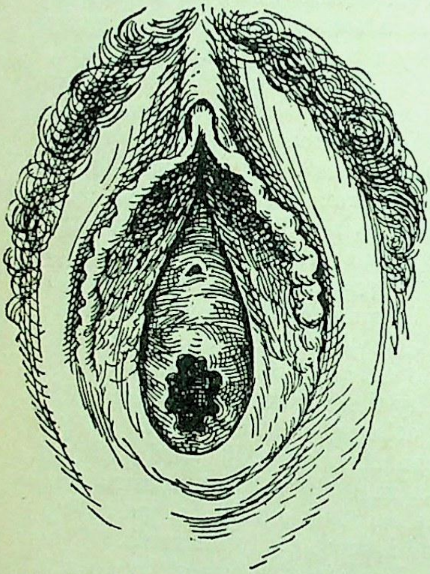


FIG. 22.—Intact Hymen, circular, with Natural Notches.

(From Peterson and Haines' *Legal Medicine.*)

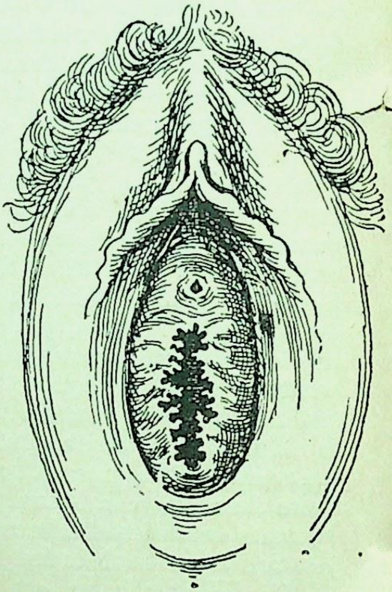


FIG. 23.—Intact Hymen, fimbriate.

(From Peterson and Haines.)

returning to its obturator-like condition, when this was withdrawn.— W. D. Sutherland, *Ind. Med. Gaz.*, 1902, 245. See also *Case* below.

The hymen may be ruptured, on the other hand, by the introduction of foreign bodies other than the penis, *e.g.* (1) accidentally,—this, however, is extremely rare; or (2) by the introduction of instruments during an examination or surgical operation; or (3) in practising masturbation, especially if the body introduced is of large diameter; or (4) in endeavours to dilate the parts of young females, so as to render them *aptæ viris:* Casper mentions a case where the mother of a girl aged ten employed first her fingers and then a long stone for the purpose,

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thereby lacerating the hymen;[1] and Chevers mentions the use in India for this purpose of the fruit of the plantain, and also of pieces of sola pith, the girl being made to sit in water, so that the pith may swell and dilate the parts.[2]

It has also been asserted that the hymen may be ruptured by indirect violence in a fall, or during violent exertion; this appears, however, to be very doubtful.

(4) **Can virginity** or non-virginity be inferred **from the condition of the hymen?** If the hymen is intact (not even

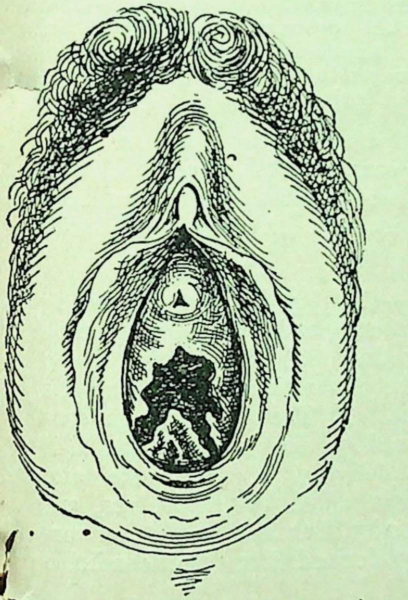


FIG. 24.—Ruptured Hymen, crescentic, with two Lateral Lacerations.
(From Peterson and Haines' *Legal Medicine.*)

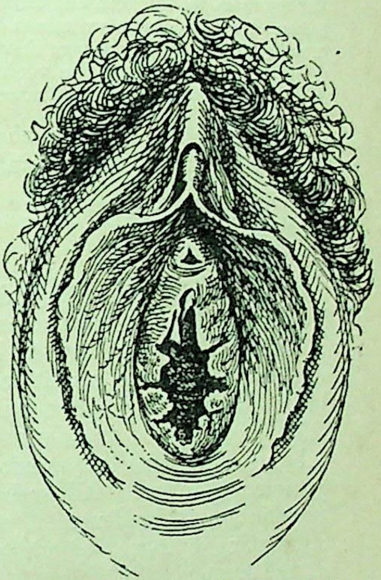


FIG. 25.—Ruptured Hymen, circular torn in Several Places.
(From Peterson and Haines.)

lacerated), the probabilities, except in the case of females below the age of puberty, are very strongly in favour of virginity; and the inference of virginity becomes almost certain if the membrane is normal in position and structure, and its aperture is of small size and undilatable; and if accompanying this condition of the hymen the other signs of virginity (see below) are present.

Case.—**Evidence of virginity** in disproof of alleged adultery.—It was alleged by defendant that the plaintiff, a married man, had had

[1] Taylor, *Med. Jur.*, II. p. 430.

[2] *Med. Jur.*, p. 689.

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adulterous intercourse with a young woman, and that at an antecedent period she had left her home for the purpose of giving birth to a child privately. The late Dr. Ashwell was called upon to examine the woman, and he deposed that, in his opinion, she was a virgin, and had never had a child.—Taylor, *Med. Jur.*, II. p. 441 ; *Frazer* v. *Bayley*, Common Pleas, Feb., 1884.

Case.—**A similar case.**—In this case, which involved an action for defamation of character, the plaintiff, a married man, *æt.* 64, had been charged with committing adultery with a certain woman. Several witnesses for the defendant positively swore that they had seen these persons in carnal intercourse. This was denied by the plaintiff; and as an answer to the case, medical evidence was tendered to the effect that the woman, with whom the adulterous intercourse was alleged to have taken place, had been examined, and the hymen was found intact. In cross-examination, however, this was admitted not to be a conclusive criterion of virginity, and a verdict was returned for the defendant.—*Ibid.*, *Delafosse Fortescue*, Exeter Lent Assizes, 1853.

On the other hand, the absence of an intact hymen, although strong evidence of non-virginity, cannot be taken as conclusive proof thereof, seeing that, as already stated, the hymen may be ruptured or lacerated by the introduction of foreign bodies other than the penis.

Other signs of Virginity.—(1) The *Breasts.*—These in young adults are hemispherical, plump, and elastic, but a single act of coitus is unlikely to alter this. (2) The *Vagina* has a narrow and rugose condition, the clitoris unenlarged, and the labia elastic and in close contact. (3) The *Fourchette* present (though it is not usually ruptured on first connection). (4) Absence of signs of previous delivery, of fourchette and perinæum entire. All such signs, taken by themselves, are unreliable as evidence of virginity, but are useful as corroborating evidence of virginity derived from the condition of the hymen.

Signs of Loss of Virginity.—These are the absence of the above signs of virginity and are :—(1) Torn hymen, (2) signs of injury, and (3) signs of implanted venereal disease—though all of these may be accounted for otherwise than by sexual intercourse.

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CHAPTER XII.

PREGNANCY IN RELATION TO CRIME AND LEGITIMACY.

Age of Marriage for Hindus.

> "If a man marry, he must select a maiden who is of a third of his age."—*Vishnu Purāna*, 3, 10; Wilson's ed., 3, 101.
>
> "Let a man of thirty years wed a lovely maid of twelve; or a man of twenty-four a maid of eight. If his virtue is being impaired let him be expeditious."—Manu, *Institutes*, 9, 94.
>
> "The marriage for all castes of a girl after her seventh year is commended, O king. Her marriage otherwise is reprobated by the law."—*Mahā Bhārata*, cited in Colebrooke's "Digest of Hindu Law," 3, 328.

The law may request (*it cannot order*) a medical man to examine a woman to ascertain whether or not pregnancy exists, for the following reasons:—

(1) *To respite a woman condemned to be hanged or to hard labour.*—When pregnancy is pleaded in bar of an execution in India, owing to the wording of *s.* 382 of the *Cr. P. Code*, the question to be decided is simply, Is the woman pregnant or not? In England, however, owing to the terms of the charge to the jury of matrons, a medical man called in to their assistance may have to examine into the further question, Is the woman "with child (pregnant) of a quick child."

(2) *The birth of a posthumous heir by a widow.*—Where a widow is suspected of feigning pregnancy in order to ultimately produce a suppositious heir to an estate of which her husband died possessed.—In such a case, according to the law of England, the heir-presumptive to the estate, *i.e.* the person who would succeed thereto, supposing the woman not to be pregnant, may apply to the court to order an inquiry to be made into the alleged pregnancy. The court, if it grants the application, does so by issuing what is technically called a writ "de ventre inspiciendo."

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(3) *To increase damages in a seduction case.*

(4) *To disprove libels in charges of adultery, etc.*—The woman alleged to be pregnant may be a married woman living apart from her husband, and the allegation may be put forward in support of a suit for divorce. Or she may be an unmarried female or a widow, who has been defamed and seeks to avoid disgrace.

(5) *In cases of alleged abortion.*—An attempt to cause miscarriage is an offence, irrespective of whether the woman be or be not pregnant. Further, according to the law of India (but not according to that of England), to cause, or attempt to cause, a woman "quick with child" to miscarry, is a graver offence than if she be not quick with child.[1] Hence, in India, in these cases the question may arise, whether or no a certain female was "quick with child" at a particular time. (See 'Causing Miscarriage.')

(6) *As motive in suicide and murder.*

Cases.—**Pregnancy a motive** for murder or suicide.—(*a*) A widow seven months gone with child died rather suddenly; an inquest was held by the police, and a verdict returned of death from dysentery. Suspicion, however, being excited, a *post-mortem* examination was ordered, the result of which was the discovery of the pregnant condition of the woman (which had been concealed in the inquest report furnished by the police), and of the fact that the cause of death was arsenical poisoning. The district magistrate remarks, in reference to this case, that there is every reason to believe that all engaged in the inquest tried to conceal the true cause of death.—*Bo. Chem. An. Rep.* for 1884, reported by the District Magistrate of Bassim, Hyderabad Assigned Districts.

(*b*) In this case, which occurred in the Surat district, as in above case, the cause of death was arsenical poisoning, and the deceased was a widow far gone in pregnancy. The brother and sister of the deceased confessed to having given her eight annas' worth of opium in order to procure abortion or to cause death, so as to avoid the disgrace arising out of her condition. No opium, however, could be discovered in the viscera of the deceased.—*Ibid.*

(*c*) Alla Bux, of Purneah, was convicted of murdering his brother's widow. He confessed that, having administered drugs to her in order to cause her to abort, and having failed, he and others took her to a river-bank, put a cloth into her mouth, held her down, and murdered her by cutting her throat.—Chevers, *Med. Jur.*, p. 733.

(*d*) Case of poisoning by arsenic reported by medical officer, Tatta, Sind.—"Deceased was promised in marriage to a man of her caste (Mussulman), but before marriage she cohabited with him and became pregnant, and was advanced to above the fourth or fifth month, when her parents, to avoid disgrace, it is said, tried very much to procure abortion, but failed (much against her intended husband's will); so having failed to procure abortion, her parents, to save their reputation, it is suspected, gave her poison in her food."—*Bo. Chem. An. Rep.*, 1876–77, p. 18.

Signs of Pregnancy. — These may be divided into:—(1) Probable and (2) Certain signs.

[1] *I. P. Code*, s. 312.

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Probable Signs.—(1) *Quickening.*—This obviously cannot be relied on for forensic purposes. Apart, however, from any wilful endeavour to deceive, a woman may be mistaken as to her condition. She may mistake, for example, symptoms of organic disease for symptoms of pregnancy. Cases are also recorded where, no organic disease being present, symptoms closely simulating those of pregnancy ('spurious pregnancy'), and, in exceptional cases, of labour also, have appeared. Again, a pregnant woman attributing her symptoms to disease, may be unaware of her condition, and remain so, even up to the time of her delivery. Further, as impregnation is independent of volition on the part of the female, conception may occur as the result of intercourse effected with her while in an insensible condition, and in such a case a woman may be unconscious of the fact that she is pregnant, and, it is possible, remain so up to the time of her delivery.

(2) *Cessation of menstruation.*—This sign is open to several fallacies. Menstruation may cease owing to causes other than pregnancy. A discharge of blood simulating menstruation may occur during pregnancy. Again, a woman may feign or deny menstruation in order to conceal her condition.

(3) *Morning sickness* is a common symptom, but it may, however, arise from causes other than pregnancy.

(4) *Changes in breasts.*—The breasts enlarge, become firmer, and secrete milk. A dark circle (areola), varying in width from half an inch to three inches, studded with glandular follicles, develops around the nipple. These appearances may, however, arise from causes other than pregnancy, or may continue after delivery. Hence they may be present in a non-pregnant female. Again they may be absent in pregnancy.

(5) *Enlargement of abdomen and changes in uterus.*—The cervix becomes full, round, soft, and elastic, and the os loses its transverse shape, and becomes circular, and its edges become soft and indistinct. Up to the end of the third month, the uterus not having risen out of the pelvis, the cervix is low down in the vagina and easily reached, and no enlargement of the abdomen is perceptible. After this the uterus begins to rise, and the cervix to shorten, recede, and become indistinct. About the end of the fourth month the enlarged uterus begins to be perceptible above the pubes, and rises to—between the pubes and umbilicus during the fifth month; the umbilicus during the sixth month; halfway between the umbilicus and the lower end of the sternum during the seventh month; and to the ensiform cartilage during the eighth month. As similar changes may take place owing to enlargement of the uterus from causes other than pregnancy, more reliance is to be placed

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on their absence as a negative sign, than on their presence as a positive sign of pregnancy.

Certain Signs.—(1) *Passive movement of fœtus* (*Ballotement*).—This sign is not available until the end of the fourth month. It consists in the detection of a solid body floating (in the liquor amnii) in the uterus.

To obtain it, the woman—her bladder and rectum having been previously emptied—should be placed in the upright position; or recumbent, with the shoulders much raised. One or two fingers of one hand are then to be introduced into the vagina, and applied to the point of the cervix. The other hand is steadily pressed on the abdomen over the uterus. A jerk upwards is then given with the fingers in the vagina, when a hard body will be felt to recede from, and in three or four seconds fall back on, the fingers. After the end of the sixth month this sign is rarely available, the fœtus, from its bulk, not floating freely enough in the liquor amnii. Care must be taken to keep the fingers in contact with the cervix, otherwise a movement of the uterus itself may be mistaken for the movement of the fœtus within it.

(2) *Sounds of fœtal heart*.—This, the most certain of the signs of pregnancy, is described as resembling the ticking of a watch heard through a pillow. The pulsations vary from one hundred and twenty to one hundred and sixty a minute, and are not synchronous with the mother's pulse. A double sound is heard at each pulsation.

The sounds are generally, but not always, in normal presentations heard about midway between the umbilicus and one or other of the anterior superior spines of the ilium; they seldom can be heard earlier than the end of the fifth month, and in every case should be heard after the seventh month. If detected, the existence of pregnancy is certain, but pregnancy may exist and the sounds not be detected (*a*) owing to the examination being made at too early a stage; (*b*) owing to the death of the fœtus; or (*c*) owing to want of skill on the part of the auscultator. Ogston records a case where owing to ascites the sounds could not be detected by a skilled auscultator.

When any doubt exists it is always better to give the individual the benefit of the doubt. After death, the discovery of an ovum or fœtus in the uterus is, of course, an unequivocal sign of the existence of pregnancy. For the characters of the ovum or fœtus at various stages of gestation, see table, p. 294. The presence also of a corpus luteum in the ovary may afford corroborative evidence.

'Quickening.'

The whole question of 'Quickening' as regards Indian Law is in relation to Section 312, Indian Penal Code.

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The term '*quickening*' is applied to certain peculiar sensations experienced by the mother at a certain stage of pregnancy. These sensations are often accompanied by constitutional disturbance, and are popularly ascribed to the first perception by the mother of the movements of the fœtus. They are most probably due to this cause, perception of the movements probably first occurring when the uterus comes into contact with the abdominal wall. These sensations may be felt as early as the twelfth week, are generally first felt between the fourteenth and twenty-fourth week, but in some cases are not felt at all during pregnancy. A woman who has felt these sensations is said to have quickened. These two terms, 'quickening' and 'quickened,' are derived from the word 'quick,' used in its old signification, namely, 'living.' Their use with reference to these sensations, arises from the old popular belief that their occurrence denoted the first accession of life to the fœtus. As, however, a fœtus is actually alive from the moment of conception, two interpretations may be assigned to the word 'quick' when applied to a fœtus *in utero*: (1) The more extended interpretation, namely, that the fœtus is alive; or (2) The more restricted interpretation, namely, that the mother has experienced the sensation known as quickening.

As regards the first of the two phrases in question, viz. "with child of a quick child," there appears to be no doubt but that this has always been used in law as if the more restricted meaning attached to the word 'quick.' Some doubt, however, has been thrown on the interpretation accepted by English legal authorities of the second phrase, viz. "quick with child," owing to the remarks made by Baron Gurney in the case of *R.* v. *Wycherley* (8 C. & P. 262). In this case pregnancy having been pleaded in bar of execution, the jury of matrons were directed to try whether the prisoner was "quick with child or not." Subsequently Baron Gurney addressed a medical witness called to the assistance of the jury of matrons as follows: "Quick with child is having conceived; with quick child is when the child has quickened. Do you understand the distinction?" Baron Gurney, therefore, in the case directed the medical witness to take the expression "quick with child" as if the more extended meaning attached to the word 'quick.' This, however, is contrary to the law as stated by Blackstone, who says: "If they (the jury of matrons) bring in their verdict quick with child—for barely with child, unless it be alive in the womb, is not sufficient—execution shall be staid." . . . "But if she (the prisoner) once hath had the benefit of this reprieve, and been delivered, and afterwards become pregnant again, she shall not be entitled to the benefit of a further respite for that cause. For she may now be executed before the child is quick in the womb." In the I. P. Code also, the expression "quick with child" is clearly used as if the more restricted meaning attached to the word 'quick.' Section 312, for example, makes causing miscarriage, if the woman be "*quick with child*," a graver offence than simply causing miscarriage, thus implying that the condition "quick with child" is one which arises at a period subsequent to conception.

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When, therefore, the question arises, is a certain woman "with child of a quick child" (or "quick with child"), what has to be determined is whether or not the woman has quickened. Quickening, however, is a sensation only felt by the mother. Still, if a medical man has, on examination, felt the actual movements of the fœtus, he is justified in assuming that the mother has also felt them, and that therefore she has quickened. Should he be unable to detect the active movements of the fœtus, he can only, in answer to the question, Has this woman quickened? state his opinion as to whether or no (1) The woman is pregnant; (2) The child is alive; and (3) The pregnancy has advanced to, or beyond, the stage at which the sensation of quickening is usually experienced; leaving it for the court to decide whether his answers do or do not amount to an affirmative answer to the question, Has this woman quickened? In giving an opinion on the last of the three above-mentioned points, a medical witness should bear in mind that quickening does not occur at any fixed period; it may occur at any time between the twelfth and twenty-fourth week. Further, it may be noted, that of the two cases in which the question of quickening arises, namely, the English case of pregnancy pleaded in bar of execution, and the Indian case of causing miscarriage; in the first the prisoner is benefited by being found "quick with child," while in the second a similar answer has the reverse effect.

The medical witness cannot say if the woman has felt quickening. She is the only competent witness to her own feelings. If, however, he (1) undoubtedly feels the movements of the child, (2) hears the fœtal heart sounds, he is justified in saying she is pregnant of a quick, *i.e.* a living, child.[1] Otherwise he can only say (1) she is pregnant, (2) the pregnancy has reached the stage at or before which quickening usually takes place.

[1] Many women have never felt quickening in their pregnancies.

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CHAPTER XIII.

BIRTH AND DELIVERY *re* INHERITANCE.

BIRTH or delivery is a more frequent medico-legal question than pregnancy. It arises when the right to inherit property or a title is in dispute. Thus when the succession is fixed in the male line to the exclusion of the female line, the question may arise, Of what sex is a certain individual? (See 'Sex,' p. 35.) Again, as by law children born "without the shape of mankind" cannot inherit, the question may arise, Has this child "the shape of mankind"? More commonly are the cases where the right to inherit is disputed, on one or other of the following grounds:—(1) That the claimant is not a legitimate child; and with the medico-legal questions which arise in such a case, we may consider those which arise in 'affiliation' cases; (2) that, as in 'tenancy by courtesy' cases, a certain child was not born alive; (3) that the claimant is a supposititious child.

Legitimacy.

Children are either **'legitimate'** or **'illegitimate,'** which is also called **'bastard.'** Only legitimate children are regarded by law as the children of their father. These, therefore, possess certain rights which illegitimate children do not possess. According to the law of most countries, only such children are held to be legitimate as are either born or begotten during the existence of a valid marriage (lawful wedlock) between their parents. By the law of Scotland, however, children born before marriage become legitimate on the subsequent marriage of their parents. Further, according to the law of England, any child born or begotten during lawful wedlock is presumed to be legitimate until the contrary is shown; (*a*) by proof of the impotence of the alleged father of the child; or (*b*) by proof that the parties to the marriage had no access to each other at any time when the child could have been begotten. The presumption, as to legitimacy, of the law of India is embodied in s. 112 of the Indian Evidence Act, and is as follows: "The fact that any person was born during the continuance of a valid

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marriage between his mother and any man, or within two hundred and eighty days after its dissolution, the mother remaining unmarried, shall be conclusive proof that he is the legitimate son of that man, unless it can be shown that the parties to the marriage had no access to each other at any time when he could have been begotten."

Access in Legitimacy Cases.—The courts in India would no doubt construe the 112th section of the Evidence Act in accordance with the English decisions. It will be noticed that the 112th section does not in terms refer to the presumption being rebutted if the husband be impotent, but proof of such impotency would negative the fact of 'access' in the sense in which it is submitted the word is used in the above section.

The English law on this subject is to be found in the answers given by the judges to questions put to them by the House of Lords in the *Banbury Peerage Case* (1 S. & S., 155, A.D. 1811). The law, as then stated, was recognized in a subsequent case, in the House of Lords, in 1837 (*Morris* v. *Davis*, 5 Cl. & F., p. 163), and is as follows:—(1st) That when the husband and wife have opportunities of access, the presumption of legitimacy may be rebutted by circumstances inducing a contrary presumption. (2nd) That non-access or non-generating access may be proved by means of such legal evidence as is admissible in every other case in which it is necessary to prove a physical fact. (3rd) That after proof of sexual intercourse evidence will not be admitted, except to disprove the fact. (4th) That sexual intercourse is presumed, unless met by such evidence as satisfies those who are to decide that it did not take place.

By 'access' is meant sexual intercourse, and not such intercourse as is understood by being in the same place or in the same house (*Banbury Peerage Case; Morris* v. *Davis*). Although possibility of such access may be proved, yet if the court is satisfied, from legal evidence, that no sexual intercourse did take place, the presumption of legitimacy is rebutted. In the case of *Aylesford* v. *Aylesford*, reported in the *Times* of July 3, 1885, the husband and wife were both living in London during the period, or some portions of the period, when the child whose legitimacy was in question could have been begotten. The circumstances of the case negatived the probability of intercourse between the husband and wife, although it was possible. The child was found, by the House of Lords, to be illegitimate. In the case of *In re Westhead's Trusts* (*Times*, July 29, 1885), there was no evidence where the husband was during the critical period during which the child could have been begotten. He, however, had at that time taken divorce proceedings against his wife. The Court of Appeal held that the circumstances of the case negatived any probability of intercourse between the husband and wife, and, being satisfied it had not taken place, held the child to be illegitimate.

In the case of *Rex* v. *Inhabitants of Mansfield* (1 Q. B. 444), the Court of Queen's Bench determined that the non-access of the husband might be proved by circumstances, "one of which," it was said, "certainly is adulterous intercourse between the husband or wife and another party." In that case the whole proof consisted only of that single fact, and it was held not sufficient to rebut the presumption. The parties, however,

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were in a low class of life, the wife being a pauper, circumstances which Kay, J., in *Hawes* v. *Draegen* (23 Ch. Div. p. 173), said must be taken into consideration in determining whether the presumption is rebutted.

Hence, the legitimacy of a child may be disputed on either of two grounds, namely, (1) that the alleged father of the child is impotent; or (2) that the parties to the marriage had no access to each other at any time when the child could have been begotten. The following examples show the medico-legal questions which may arise when legitimacy is disputed on the second of these two grounds.

1. A husband on a certain date ceases to have access to his wife; after a certain interval the wife is delivered of a child. In such a case the legitimacy of the child may be disputed, on the ground that the interval between the last access of the husband and the birth of the child was greater than the utmost period to which gestation can be prolonged.

2. The parties to a marriage are proved, after a long period of separation, to have resumed access to each other on a certain date. After the lapse of a certain interval the wife is delivered of a child. In such a case the legitimacy of the child may be disputed, on the ground that the period intervening between the date of resumption of access and the date of the child's birth was so short, that the child must have been begotten before access was resumed. If in such a case the appearance of the child at birth indicates it to be a mature child, the question arises, What is the shortest natural period of gestation? or if the child is an immature child, what, judging from its appearance, was its uterine age at the time of its birth (see pp. 291 *f.*)? Again, in such a case it may be alleged that the mere fact that the child was born alive and capable of being reared, proves that its uterine age at birth was greater than the interval which elapsed between resumption of access and birth, thus raising the question, What is the earliest period of gestation at which a 'viable' child can be born, *i.e.* one capable of living and being reared? Moreover, as a portion of the evidence bearing on the question of early viability is derived from cases where a viable child has been born a short time after a previous delivery, and as such cases may be accounted for by 'superfœtation' (*i.e.* conception of a second ovum during gestation of a first), the further question arises, Is superfœtation possible?

It may be here remarked that, as his wife's adultery is a ground on which a husband may claim a divorce, questions similar to those arising in cases of contested legitimacy may arise in suits for divorce. The question as to the degree of maturity of a child may also arise in cases where a child is

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born soon after marriage, and where it is alleged that the parents must in consequence have had sexual intercourse before marriage, and are therefore of immoral character (see following case).

Case.—**A viable child** born one hundred and seventy-four days after marriage. The Rev. Mr. Jardine was married on the 3rd of March, 1835, and on the 24th of August following his wife was delivered of a girl, who, supposing her to have been the fruit of sexual intercourse on the day of the marriage, was only one hundred and seventy-four days, or five calendar months and twenty-one days old. The infant, which was undoubtedly immature, though to what degree could not be determined, died on the 20th of March, 1836, having survived about seven months. On this Mr. Jardine's parishioners brought a charge of incontinency against him before the General Assembly of the Church of Scotland, alleging that he must have had intercourse with his wife before marriage. The main question in the case was:—Was it possible that a child not more than one hundred and seventy-four days old at birth, could be maintained alive for seven months? The court found the charge 'not proven.'—The Jardine Case: Guy, *For. Med.*, p. 127.

Affiliation cases.—Although illegitimate children are regarded by law as the sons of nobody, their father is bound to contribute towards their support until they have attained a certain age. Hence, a woman having been delivered of an illegitimate child, may appear before a court and claim that a certain individual, who she alleges is the father of her child, may be compelled to so contribute. Such cases are called 'affiliation cases,' and in them questions may arise similar to those arising in cases of contested legitimacy. In affiliation cases also the further question may arise, Can any opinion as to the paternity of the child be formed from its resemblance or non-resemblance to its alleged father?

Tenancy by courtesy.—By the common law of England, if a man survived his wife, and he had issue by her born alive, that might by possibility inherit the estate as her heir, the husband so surviving became entitled to an estate for the residue of his life in such lands and tenements of his wife as she was solely seised of in fee simple, or fee tail in possession. The husband, while in enjoyment of this estate, is called a tenant by the courtesy of England, or, more shortly, tenant by courtesy.[1]

To establish this tenancy by courtesy, the child must be born during the existence of this marriage, and hence, although the right accrues to the husband if the child is extracted by Cæsarean section during the mother's life, it does not accrue if the child is so extracted after her death, for in that case the marriage has ceased to exist before the birth of the child. Further, the child must have been completely born, and must, after complete birth, have manifested some sign of life; the slightest sign

[1] Williams on *Real Property*, p. 274.

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of life, however, a mere tremulous motion of the lips, for example (see following *Case*), has been held by the English courts sufficient to establish the fact of live birth in these cases.[1] Much stronger evidence of live birth is, however, required in cases of infanticide (see 'Infanticide'). As in a case of disputed right to tenancy by courtesy, it may be alleged in opposition to the claim, that the child, when born, was so immature that it could not possibly have manifested any sign of life after birth; the question may arise in these cases, What is the earliest period of gestation at which a child can be born capable after birth of manifesting signs of life?

Case.—**Proof of live birth** in a tenancy by courtesy case.—The wife of the plaintiff, who was possessed of an estate in her own right, died after having given birth to a child. The child was supposed to have been born dead, and the estate was surrendered to the defendant, her heir. Ten years afterwards facts came to the knowledge of the plaintiff which led him to believe that the child was born alive, and that he had therefore wrongfully surrendered the estate. The evidence of live birth was as follows: it was proved that the accoucheur in attendance (who had died before the trial) had, an hour before the child was born, declared it to be alive, and ordered a warm bath to be prepared for it. Further, two women, who after the child was born placed it in the bath, swore that they twice saw a twitching or tremulous motion of the lips of the child. This motion of the lips was the only sign of life observed, but it was held sufficient to establish the fact of live birth.—*Fish* v. *Palmer;* Taylor, *Med. Jur.*, II. p. 207.

It is possible that a claim to be tenant by the courtesy might arise in India, as there are estates held in India subject to the English Law of Inheritance (see remarks of Mr. Justice Pontifex in case below). No such claim, however, could be made by any one whose marriage had taken place since the 31st of December, 1865, as *s.* 4 of the Indian Succession Act, 1865, enacts that no person shall by marriage acquire any interest in the property of the person whom he or she marries. That section, by s. 331, is not applicable to marriages contracted before the 1st January, 1866.

Case.—**Tenancy by courtesy in India.**—In this case the widow of an Armenian, married before the Dower Act 29 of 1839, was held to be entitled to dower out of her husband's lands. In the course of the argument, Pontifex, J., remarked: "It would take away from the mutuality of contract between husband and wife to hold that the widow is not entitled to dower as against a purchaser from her husband. The husband is entitled to an estate by the courtesy of his wife's lands."—*Sarkies* v. *Prosonomoyee Dossee*, I. L. R., 6 Calc., p. 794.

Supposititious children.—By a supposititious child is meant a child produced by a woman who avers it to be hers when it is not. In these cases the motive is generally to further an attempt either to extort money or to divert

[1] The Scotch courts require, in order to establish the fact of live birth in civil cases, proof of commencement of respiration (Ogston, *Lect. on Med. Jur.*, p. 182). For crying as a proof of birth, see 'Infanticide,' Chap. XVI.

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succession to property. A supposititious child may be one (1) produced by a woman who has never been delivered of a viable child, or (2) produced by a woman in substitution for a child of her own. In case (1), besides questions similar to those occurring in legitimacy cases, the following additional questions may arise: (*a*) Is this woman sterile? and (*b*) does this woman show signs of having been recently or previously delivered of a viable child? In case (2) it is very seldom that medical evidence can afford any assistance. In both cases, as in affiliation cases, the question of how far the paternity of a child can be inferred from its resemblance or non-resemblance to its alleged parents may also arise.

Case.—Slingsby baby, 1916.

Inheritance.

The chief medico-legal questions which may arise in cases of disputed right to inherit are: (1) Is a certain individual impotent or sterile? This question has already been considered (see 'Impotence and Sterility'). (2) What is the natural period of human gestation? (3) How far may this period be prolonged? (4) Is superfœtation possible? (5) What is the earliest viable age? (6) What are the characters of children born at various periods of gestation? (7) How far may the paternity of a child be inferred from its resemblance or non-resemblance to its alleged parents? (8) Has this woman ever been delivered of a viable child?

The Average Period of Human Gestation?—The duration of gestation may be estimated by: (1) Observation of the period intervening between cessation of menstruation and delivery; and (2) observation of the period intervening between a single coitus and delivery. Of these two methods the first cannot be relied upon to give precise results, because (*a*) menstruation may cease from causes other than pregnancy, or may continue after pregnancy has commenced; and (*b*) impregnation may occur at any period during the menstrual interval. The second method, although more precise than the first, also cannot be relied on to give accurate results, because impregnation is not necessarily coincident with coitus, but may occur as long thereafter as the spermatozoa retain their vitality, which they may do for several days after emission. The duration of natural gestation appears to be not a fixed period, but one subject to variation within certain limits. Guy, for example, states that of fourteen authentic cases in the human subject, in which the duration was ascertained by reckoning from a single coitus, the minimum duration was

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270, the maximum 293, and the average 284 days.[1] Again, Wharton and Stillé give a table of all the authentic cases of this kind in the human subject they have been able to collect.[2] Their table includes fifty-six cases, and shows a range of duration of from 260 to 296 days, with an average of 276 days.

The view that the duration of pregnancy is not a fixed period is supported by the results of observations on the lower animals. Thus from three series of observations on cows, the minimum period in these appears to be 241 days, and the average period 280 to 285 days: but in one series[3] (160 animals) a period of 308 days was observed; in the second series[4] (764 animals) a period of 313 days was noted; and in the third[5] (1105 animals), in four delivery took place in the forty-eighth week, equal to a duration of over 329 days; and in one in the fifty-first week, equal to a duration of over 350 days. Again, a series of 102 observations on mares[6] gave a range of 311 to 394 days, with an average of about 340 days; and another on 177 sheep,[7] duration of 145 to 171 days, with an average of 150 days.

How long may Human Gestation be prolonged?—The chief considerations bearing on this question are as follows:—

1. Of the fifty-six authentic cases collected by Wharton and Stillé, in which the duration of gestation was fixed from a single coitus, in nineteen the duration was over 280 days, and in two of these it was 291, and in three others 296 days.

2. In exceptional cases, where the commencement of pregnancy has been fixed by the death or absence of the husband or male, a longer period than 296 days has been recorded. Thus Guy, on the authority of Hewitt, quotes a case in which the duration of pregnancy, as fixed by the sudden death of the husband, was 308 days; and in two less satisfactory American affiliation cases, in which the commencement of pregnancy was fixed by date of last intercourse, the alleged duration was respectively 313 and 317 days. In both these cases the court decided in favour of the plaintiff, thus admitting the possibility of prolongation of pregnancy to the periods stated.

3. In a very large number of cases recorded by various authorities, in which the duration of pregnancy was estimated from the last day of menstruation, the longest period recorded was 325 or 326 days. As, however, conception may occur at almost any period during a menstrual interval, these cases cannot be relied on as showing anything more than that pregnancy may be prolonged for 325 or 326, less (say) 23 days. This would give 303 days, or a shorter period than in Hewitt's case. In four less certain cases of the same kind, the estimated period of gestation was 309 to 313 days (Simpson), and 314 and 324 days (Murphy).

4. In the lower animals it has been observed that the duration of pregnancy, as estimated from a single coitus, may be greatly protracted beyond the usual period.

[1] *For. Med.*, p. 123.
[2] *Med. Jur.* (1884), III. p. 41.
[3] Tessier's, Guy, *For. Med.*, p. 124.
[4] Earl Spencer's, *ibid.*
[5] Krahmer's, Wharton and Stillé, III. p. 44.
[6] Tessier's, Guy, *For. Med.*, p. 124.
[7] Krahmer's, Wharton and Stillé, III. p. 43.

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On the whole, therefore, as regards the question, What is the longest period which in natural human gestation may intervene between coitus and delivery?—the form which the question under consideration assumes for forensic purposes,—it may be stated that: (1) It may be regarded as proved that this may be 296 days. (2) Most authorities agree in considering that the interval may be as long as 44 weeks, or 308 days. Indeed, in the Gardner Peerage case, several eminent obstetricians gave it as their opinion that the interval might extend to, at any rate, 311 days.[1] (3) Some authorities consider that the interval may extend to the forty-sixth week, 315 to 322 days.[2]

Superfœtation.—It may be stated (1) that two closely following acts of intercourse in the same female may each prove fruitful (see case below); and (2) that it cannot be doubted but that conception may occur during pregnancy in cases where the uterus is double or bipartite, a rare condition in the human female, but still one of which several instances are recorded.

Case.—**Two closely following acts** of intercourse in the same female; both prove fruitful.—"A female at Charleston, in South Carolina, was delivered in 1714 of twins within a very short time of each other. One was black and the other white. She confessed that on a particular day, immediately after her husband had left his bed, a negro entered her room, and by threatening to murder her had connection with her."—Guy's *For. Med.*, p. 132, one of several cases quoted by Beck.

Excluding these two classes of cases, and limiting the question to whether, the organs of the female being of normal formation, it is possible for a conception of a second embryo to occur during gestation, we find that authorities are divided in opinion on the subject. The arguments for and against the possibility of conception occurring under the conditions stated are founded on (1) physiological considerations, and (2) recorded cases.

1. Physiological considerations.—Those who deny the possibility of the occurrence, allege that the plugging of the os uteri and Fallopian tubes, and the formation of the decidua, events which occur at a very early stage of pregnancy, offer an impassable barrier to the passage of the seminal fluid. On the other hand, those who affirm the possibility of superfœtation, deny that these conditions invariably offer an impassable barrier to the seminal fluid (especially previous to the end of the third month),[3] and point out that, as in exceptional cases menstrual blood finds its way out of the uterus during pregnancy, it is by inference also possible that seminal fluid may find its way in.

[1] In this case the question at issue was as to the legitimacy of an individual, born 311 days after the last access of the husband (see Guy, *For. Med.*, p. 125).

[2] See Ogston's *Lect. For. Med.*, p. 189.

[3] It is not until the end of the third month that the decidua reflexa, or portion of the decidua surrounding the ovum, comes into contact with the decidua vera, or portion of the decidua lining the uterus.

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2. **Recorded cases.**—The cases brought forward in support of the view that superfœtation is possible, may be divided into two classes, viz.:—(*a*) Cases in which a woman is delivered at or about the same time of a more or less mature child and a less-developed dead fœtus, *e.g.* as in a reported case of a mature child and a dead fœtus of apparently five months. Many cases are, however, reported showing that a dead fœtus may be retained in the uterus until the full term of pregnancy has expired, or even for a considerable period beyond. Hence cases of this class can be explained on the supposition that conception of the two children occurred at the same time, but that one died and was retained *in utero* until the delivery of the other. Obviously, therefore, such cases do not support the view that superfœtation is possible.

(*b*) Cases in which a woman is delivered of two more or less mature children, a considerable interval, but still an interval shorter than the usual period of gestation separating the two births. Cases of this kind, where the interval between the births is comparatively short—*e.g.* in one reported case a month—are easily explained on the supposition that conception of the two children occurred at the same time, but that the delivery of one was delayed. Other cases of this description again, in which the interval between the two births is comparatively long, can be explained by supposing that conception of the second child occurred after delivery of that first born. It should, however, be noted, as bearing on this possibility, that it is highly improbable that conception can occur until a week after delivery; probably a fortnight must intervene.[1] A few cases, however, are on record in which the interval separating the births of two viable children has been four to five months, *e.g.* *Case* below, and a case referred to by Taylor, in which the interval was 127 days (see also *Case* below, in which the interval was 167 days, but in which no sexual intercourse took place until twenty days after the first delivery).

Supposed superfoetation.—The wife of Raymond Villard, of Lyons, eight months after a previous abortion at the seventh month, was delivered of a living female child. "This delivery was not followed by the usual symptoms, no milk appeared, the lochia were wanting, and the abdomen did not diminish in size. Three weeks after her delivery she again felt the motions of a fœtus, the abdomen increased in size, and five months and sixteen days after delivery she was again delivered of a living daughter." Both children were alive two years after the birth of the first child. "Dr. Desgranges, who attended the case, adds to his report that the second child could not have been conceived after delivery of the first, inasmuch as no sexual intercourse took place between the husband and wife until twenty days after the first delivery," or four months and twenty-seven days before the birth of the second child (Guy, p. 133).

"Marie Anne Biguad, *æt.* thirty-seven, gave birth on April 30, 1748, to a full-term mature boy, which survived its birth two and a half months, and to a second mature child (girl) on September 16, 1748, which lived one year. The interval between the two births was thus four and a half months (= one hundred and thirty-nine days). The mother, after her death, was proved not to have had a double uterus" (Tidy, *Leg. Med.*, II. p. 149, quoted from Naphey, 'Physical Life of Women,' p. 156).

Cases such as these involve the acceptance of one of three propositions, viz. either (1) That superfœtation is possible, even as in the former case, when the uterus is not double; or (2) Supposing conception of the second child to have taken place after the birth of the first, that a viable child may

[1] Bonnar, *Edin. Med. Jour.*, Vol. X. p. 582.

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be born at a very early uterine age, *e.g.* in Taylor's case at 127, or more probably 120 days; or (3) As suggested by Wharton and Stillé; that in cases of twin pregnancy the pressure of one child on the other, instead of, as is sometimes the case, causing the death of one of the two, may in exceptional cases simply retard its development; the result being that one child is born mature at the full period, and after its birth, development of the second child continues, until it also reaches maturity, when its birth takes place.

What is the earliest Viable Age?—What is the earliest period of gestation at which a child may be born alive, capable of living and being reared?—Here it may first be remarked (1) that there is no doubt but that a child born at or after the 210th day of uterine life may be reared; and (2) that the evidence afforded by recorded cases so strongly supports the view that children born as early as the 180th day may be reared, that the possibility of this cannot be denied. As regards the question of viability before the 180th day, it should be noted that the validity of the evidence afforded by cases cited to prove early viability mainly depends on the accuracy with which the date of conception is determined; for although the characters of a child at birth afford indications of its age, they cannot be relied on, except as corroborative evidence. In some of the cases cited as evidence of early viability, the date of conception is fixed from a previous delivery, *e.g.* the case mentioned by Taylor (see 'Superfœtation'), in which a viable child was born 127 days after a previous delivery, and another similar case referred to by the same author, in which the interval between the births was 174 days.[1] If we assume that in these cases conception of the second child did not take place until after the birth of the first, we must admit viability to be possible at respectively the 120th and 167th day of intra-uterine age. Obviously, however, the acceptance of cases such as these, as valid evidence of early viability, rests on the assumption that it is impossible for either superfœtation or retardation of development, as suggested by Wharton and Stillé, to occur.

Of the cases in which the date of conception is fixed independently of a previous delivery, there is one—Dr. Outrepont's case (see p. 290)—in which a viable child was born twenty-five weeks (175 days) after the last menstruation of the mother. Guy, in reference to this case, says—"It is very valuable, for it is the only quite unequivocal instance on record of the rearing of a six-months child."[2] The Jardine case (*Case*, p. 284) is a very doubtfully authentic case of the rearing of a 174-day child.

[1] Taylor, *Med. Jur.*, II. 229.
[2] Guy's *For. Med.* (4th ed.), p. 136.

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There are also a few less reliable cases of the rearing of children born at a period earlier than the 174th day.[1] Among these, the earliest visible age recorded in 133 days (Dr. Rodman's case).[2] The evidence afforded by these cases, in favour of viability at a period earlier than the 174th day, is further supported by certain recorded cases, in which children born at an earlier age than this lived for some days after birth.[3]

As regards the further question, What is the earliest age at which a child may be born, capable after its birth of showing signs of life? it may be stated, that there is more than one reliable case on record, showing that a child born between the fourth and fifth month of uterine life may after birth manifest signs of life. Among these may be mentioned Dr. Barrow's case of a child born at 144 days, which after birth breathed convulsively at intervals for forty minutes.[4]

After the fourth month the uterine age of the fœtus is indicated by the following characters. (A) During life:—(1) Its length and weight; (2) changes about the eyes; (3) the appearance of the skin, nails, and scalp hair; and (4) the position of the middle point of the body. (B) After death the following additional characters become available:—(1) The progress of ossification; (2) the condition of the intestines; (3) the condition of the gall-bladder; (4) the position of the testicles; and (5) miscellaneous characters. According to Guy, Tidy, and others, these characters are as follows:—

1. **The length and weight.**—The table below gives the average length in inches, and average weight in pounds and ounces, at the end of each month.

Month.	Length.	Weight.
	in. in.	lb. oz. lb. oz.
4	4½—8½	0 3—0 7
5	6½—10½	0 5—1 1
6	8—13½	1 0—2 2
7	11—16	2 0—4 5
8	14—18	3 4—5 7
9	16—20	4 5—7 0

[1] *E.g.* Dr. Barker's case, 158 days (*Med. Times*, 1850, Vol. II. pp. 249, 392), and Capuron's doubtful case of Fortunio Liceti, 135 days (Guy's *For. Med.*, p. 129).

[2] Guy's *For. Med.*, p. 129.

[3] *E.g.* Fleischmann's case of a child of 168 days living for eight days (Guy, *For. Med.*, p. 134), and Dr. Routh's case of a child born between the fifth and sixth month living for eighteen days after its birth (*Obstet. Trans.*, 187[illegible], p. 182).

[4] Wharton and Stillé, Vol. III. p. 51.

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Exceptional cases are recorded of children at birth being unusually large and heavy. The greatest length and weight recorded appears to be 32 inches, and 18 lbs. 1 oz.; next to this comes a case where the length was 24 inches, and the weight 17 lbs. 12 oz.[1]

2. **Changes about the eyes.**—The eyelids are adherent, and the membrana pupillaris vascular and distinctly visible up to the end of the sixth month. At the end of the sixth month, the eyebrows and eyelashes are beginning to form. At the end of the seventh month, the eyelids are non-adherent, and the membrana pupillaris is beginning to lose its vascularity, and by the end of the eighth month, it is so thin and transparent as to be only with difficulty discernible.

3. **Appearance of the skin, nails, and scalp hair.**—Up to the end of the fifth month the skin is destitute of fibrous structure and sebaceous covering. At the end of the sixth month, it begins to show a fibrous structure, and papillæ begin to appear; at this period it is covered with down, and sebaceous matter begins to be visible on its surface. At the end of the seventh month, it is dusky red, thick, and fibrous, and covered with sebaceous matter. By the end of the eighth month, it is covered with fine short hairs, and the sebaceous envelope is well marked. At the end of the ninth month, the down has disappeared from the surface of the body except the shoulders. The nails begin to appear at the end of the fourth month, are very distinct at the end of the fifth month, and gradually increase in length, reaching the ends of the fingers at the end of the eighth month. Hair on the scalp begins to appear at the end of the fifth month, is about quarter of an inch long at the end of the seventh month, and at the end of the ninth month has attained a length of about an inch.

4. **The position of the middle part of the body.**—This up to the end of the fifth month lies on the body of the sternum; gradually descending, it reaches the lower end of the sternum at the end of the sixth month, is nearer the umbilicus than the sternum at the end of the eighth month, and at the end of the ninth month is generally about three-quarters of an inch above the umbilicus.

FURTHER SIGNS AVAILABLE AFTER DEATH.

1. **Ossification.**—At the end of the fourth month the ossicles of the ear are found ossified, and points of ossification have just appeared in the upper part of the sacrum (for points of ossification appearing before the end of the third month, see table on page 294). By the end of the fifth month, points of ossification have appeared, in the pubis, os calsis, axis, and odontoid process; at the end of the sixth month, in the four divisions of the sternum; at the end of the seventh month, in the astragalus; at the end of the eighth month, in the last sacral vertebra; and at the end of the ninth month, in the lower epiphysis of the femur. This last point of ossification is not present at the end of the eighth month, and great weight is attached to it by Casper and others, as a sign of maturity. According to Casper, its diameter in mature children is three-quarters of a line to four lines, and Tidy adds that if it is more than three lines in width, the child has probably survived its birth. "This

[1] Taylor, *Med. Jur.*, II. p. 314.

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nucleus appears to the naked eye as a more or less circular blood-spot in the midst of milk-white cartilage."[1]

2. **Intestines.**—At the end of the fourth month, the duodenum contains meconium, the cæcum is placed near the right kidney, and the cæcal valve is visible. At the end of the fifth month meconium of a yellowish-green tint is present at the commencement of the large intestines. At the end of the sixth month in the large intestine sacculi begin to appear, and meconium is present in the upper part. At the end of the seventh month the cæcum lies in the right iliac fossa, the valvulæ conniventes begin to appear, and meconium is present nearly throughout the whole length of the large intestine. At the end of the ninth month the meconium has reached the rectum.

3. **Gall-bladder.**—The gall-bladder begins to appear at the end of the fourth month, is distinct at the end of the fifth, contains insipid serous fluid at the end of the sixth, and bile at the end of the seventh month.

4. **Position of testicles.**—At the end of the sixth month these lie close to the kidneys, and at the end of the seventh have begun to descend towards the internal ring, which they reach at the end of the eighth month. At the end of the ninth month they have, as a rule, passed through the canal and are often found in the scrotum.

5. **Other characters.**—At the end of the fifth month the germs of the permanent teeth are visible; at the end of the sixth month the cerebral hemispheres cover the cerebellum. At the end of the seventh or eighth month the cerebral convolutions are apparent.

(7) **Paternal Likeness and Disputed Paternity.**—*May paternity of a child* be inferred from its resemblance or non-resemblance to its alleged parents?—Undoubtedly peculiarities of the parents are frequently transmitted to their offspring, *e.g.* the general characters of the features, the colour of the skin, certain deformities, tendency to disease, tricks of manner, character of the voice, colour of the hair, etc., etc. Peculiarities in the parents are, however, not necessarily transmitted to their children, and, as before pointed out, a peculiarity may be subject to atavism, and miss one generation, appearing in the next. More weight, therefore, is to be attached to the presence of hereditary peculiarities as affirmative evidence than to their absence as negative evidence, of paternity. Other things being equal, the more close the resemblance, the stronger the presumption of paternity.

Recent Delivery.—*Has this woman* ever *been delivered* of a viable child?—The signs of recent delivery may be present and supply an affirmative answer—these signs will be discussed under 'Infanticide' (see p. 328). On the other hand, the signs of virginity may be present—the presence of these, especially of an intact hymen, is a strongly negative indication. An intact

[1] Tidy, *Leg. Med.*, II. p. 59 (1 line = $\frac{1}{12}$th of an inch).

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EXTERNAL CHARACTERS OF THE FŒTUS AT THE END OF EACH MONTH OF UTERINE LIFE.

Month	4	5	6	7	8	9
Average length in inches Mean weight (Guy)	$6\frac{1}{2}$ 5 ozs.	$8\frac{1}{2}$ 11 ozs.	14 2 lbs. 2 ozs.	15 3 lbs. 8 ozs.	17 4 lbs. 5 ozs.	$19\frac{1}{2}$ 6 lbs. 8 ozs.
Skin	No sebaceous covering or fibrous structure apparent		Fibrous structure, papillæ and sebaceous matter beginning to appear covered with down	Dusky red; thick and fibrous, and covered with sebaceous matter	Covered with fine short hairs and sebaceous matter	Down almost all disappeared; covered with sebaceous matter
Nails	Appearing	Very distinct	Growing	Do not quite reach to end of fingers	Reach to end of fingers	
Hair on scalp	None	Appearing	Distinct	About a quarter of an inch long	Over a quarter of an inch long	About one inch long
Eyes, etc.	Lids adherent; membrana pupillaris distinct		Lids adherent: membrana pupillaris distinct; eyebrows and eyelashes beginning	Lids non-adherent; membrana pupillaris getting indistinct	Membrana pupillaris hardly visible	
Position of middle point of body	On sternum	On sternum	At lower end of sternum	Below lower end of sternum	Nearer umbilicus than sternum	Just above the umbilicus

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hymen may be taken as positive proof that the woman has never been delivered of a nearly mature child. Obviously, however, no conclusions can be drawn from the absence of the signs of virginity.

If the **signs** of recent delivery and virginity are both **absent,** the other chief signs to be looked for are:—

1. **Presence or absence** of the lineæ albicantes and condition of the breasts.—The presence of the lineæ and albicantes may, however, be accounted for by causes other than delivery, *e.g.* ovarian tumours, or ascites; and they may be absent in women who have been more than once delivered.[1] Enlargement of the breasts also may be the result of causes other than pregnancy.

2. **The condition of the posterior commissure.**—This, if ruptured, strongly indicates a previous delivery. If intact, the indication is strong that the woman has never been delivered of a child, and still more strong that she has never been delivered of a mature child.[2]

3. **The condition of the uterus.**—After delivery, the uterus does not wholly return to its original condition. The chief changes observable are as follows:—

(*a*) Its cavity becomes larger. According to Dr. Barnes,[3] the vertical diameter of the cavity is, in virgins 1·80, in women 2·20, and in mothers 2·44 inches; and the transverse diameter of the cavity, in virgins 0·60, in women 1·08, and in mothers 1·24 inches.

(*b*) Its walls become thicker and its weight greater. According to Dr. Barnes its weight, in girls at the age of puberty, is 360 to 1000 grains, whilst in women who have borne children its weight ranges from 1200 to 1800 grains. In advanced life, however (and in exceptional cases, in adult life after delivery), the uterus undergoes atrophy, and in old women its weight may become reduced to 100 to 200 grains.

On the whole, although the conditions of the uterus may afford strong indication of a previous delivery, no absolutely certain conclusion can be drawn from its state.

The question, "Has this woman ever been delivered of a child?" may also arise in *defamation* cases and in cases of *disputed identity*. In the trial for murder, *R.* v. *Wainwright*, cited below, this question arose with reference to the identity of the remains discovered and alleged to be those of a certain female who was missing. From the opinion expressed by Dr. Meadows in this case, it would appear that, in the

[1] Taylor, *Med. Jur.*, II. p. 162. [2] Tidy, *Leg. Med.*, II. p. 138. [3] *Dis. of Women*, p. 32.

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absence both of the signs of recent delivery, and of those of virginity, no certain answer can be given to this question.[1]

Case.—**Signs of previous delivery in exhumed corpse.**—The prisoner was tried for the murder of a woman with whom he had cohabited, and who had two children by him, the last being born about nine months previous to the time of her supposed murder. A year after her disappearance the mutilated remains of a female were discovered buried in premises belonging to the prisoner. Examination of these showed the uterus to be enlarged and flaccid; its walls were unusually thin. There were one or two white lines in the skin of the lower part of the abdomen, and other marks of a darker colour in the inguinal region. Two medical men who had examined the remains were of opinion that they were those of a woman who had borne a child. Dr. Alfred Meadows, called for the defence, was of the contrary opinion, but stated that he believed it to be impossible to decide this question in any case with certainty.—*R.* v. *Wainwright.*

[1] Taylor's *Manual*, p. 496.

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CHAPTER XIV.

RAPE.

(See also Chap. XI. on 'Virginity and Defloration.')

THE crime of rape is a felony punishable by imprisonment up to penal servitude for life; and formerly it was punished by castration and death. As it is usually committed in the absence of witnesses the law admits the testimony of the alleged victim, but the medical evidence is essential, as a large proportion of the accusations are false charges.

Definition of Rape.—According to the law of India (*I. P. C.*, *s.* 375, and also according to that of England[1]), rape, subject to certain explanations detailed below, may be defined as sexual intercourse by a man with—(1) any female (including his own wife) under the age, in India, of twelve[2] (in England it is thirteen), or (2) any female over the above-stated age, not being the man's own wife—(*a*) against her will, or (*b*) without her free consent, or (*c*) even with her consent, when this has been obtained in certain unlawful ways. The explanations above referred to are:—

Degree of penetration necessary to constitute 'Rape.'—In India, the rule on this point is laid down in the explanation attached to *s.* 375 of the Penal Code as follows:—"*Penetration is sufficient to constitute the sexual intercourse necessary to the offence of rape,*" and in the case of *Reg.* v. *Ferroll* (Bombay High Court Sessions, February, 1879), Green, J., directed the jury that *vulval penetration only* was sufficient, under the law of India, to constitute rape (see *Case* below) without actual seminal emission. In this case the prisoner was charged with rape on a child six years old. The child had not complained, and admitted on cross-examination that she had not been hurt. The medical evidence proved there was no injury to the parts. The child was found to be suffering from gonorrhœa, so was the prisoner. It was clear that the penetration (if any) had been only vulval. Green, J., directed the jury that this was sufficient to constitute rape, and the prisoner was convicted of rape.—*Reg.* v. *Ferroll*, Bombay High Court Sessions, February, 1879.

[1] *Criminal Law Amendment Act*, 1885 (48 & 49 Vict. c. 69, *s.* 4).
[2] Act X. of 1891, *s.* 1.

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Age of the Male accused.—As already pointed out, it is an irrebuttable presumption of English law that a boy under the age of fourteen is incapable of committing rape. In England, therefore, a boy under the age of fourteen cannot be convicted of this offence. The criminal law of India contains no special presumption as to the age at which a boy attains potency, and becomes capable of committing rape. It, however, contains two general exceptions bearing on the question of age in regard to criminal responsibility, and applying to rape as to other offences. These exceptions are in effect (1) that a child under the age of seven cannot be held criminally responsible for his acts, and (2) that a child between the ages of seven and twelve can only be held criminally responsible for his acts if he has attained a certain specified degree of maturity of understanding (*I. P. C.* 82, 83). Hence, in India, if the case of a boy charged with rape does not fall within one or other of these general exceptions, the question of the capacity of the accused to commit the offence is left to the court to decide according to the evidence produced in the case. Thus, "in the case, *Kureem Noorbae* v. *Meun Noorbae* (2 *N. A. Rep.*, p. 87), a boy of ten years was convicted for rape by the Court of Sessions, but the Nizamut Adawlut, considering it unadvisable to admit his capability, viewed the matter only as an attempt."—O'Kinealy's *Penal Code*, p. 177.

Age of consent in Female.—In Indian law sexual intercourse with a female of or over the age of twelve, with her valid consent, is not an offence, but see p. 42. According to the law of England, however, sexual intercourse with a female of or over the age of thirteen, but under that of sixteen,[1] with her consent, is (unless it be proved that the accused had reasonable cause to believe that the girl was of or above the age of sixteen) a misdemeanour punishable less severely than rape.[2] Marriage is no defence in this case, notwithstanding that the marriageable age for a female in England is twelve years of age, and the fact that the girl forgives the accused or subsequently enters into the marriage relations with him, does not relieve him technically from the crime, as the law holds that the female being under the age of consent, her consent as to the sexual act constitutes no defence, though such forgiveness by her for her injury and acceptable amends usually terminate the prosecution.

Consent of the Female is invalid under the following circumstances:—In Indian law consent of a female to sexual intercourse is not valid, and does not exculpate the accused, if the manner in which it has been obtained falls within (*a*) certain general exceptions of the Penal Code in regard to consent (see *s.* 90); or (*b*) certain special exceptions in regard to consent to sexual intercourse embodied in *s.* 375 of the *Code*, namely:—(1) If it is given *under misconception of fact*, and the man knows, or has reason to believe, it was so given (*s.* 90). (2) If the woman by reason of *unsoundness of mind, or intoxication*, is unable to understand the nature and consequence of the act to which she consents (*ibid.*). (3) If her consent has been obtained by putting her in *fear of death or hurt* (*s.* 375). (4) When the man *impersonates her husband*, and her consent is given because she believes that he is another man to whom she is, or believes herself to be, lawfully married (*s.* 375). Regarding these exceptions it may be noted:—(1) That, as regards exception 1, a female, for her consent to be valid, must be aware that the act to which she consents is sexual intercourse. On this point the law of England

[1] Confer p. 42. By *Criminal Law Amendment Act*, 1885, *s.* 5, imprisonment with or without hard labour not exceeding two years may be imposed.

[2] In the United States of America the age of consent is 18.

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agrees with that of India (see *Case*, below). (2) That, as regards exception 2, the law of England appears to differ somewhat from that of India, it having been decided in the case of *R.* v. *Fletcher*,[1] in which a man was charged with rape on an idiot, that "a consent resulting from a mere animal instinct would suffice to prevent the act from constituting a rape." By *s.* 5 of 48 & 49 Vict. c. 69, however, sexual intercourse with "any female idiot, or imbecile woman or girl, under circumstances which do not amount to rape, but which prove that the offender knew, at the time of the commission of the offence, that the woman or girl was an idiot or imbecile," is a misdemeanour punishable less severely than rape. (3) That the law of England agrees with that of India in regard to exception 3. (4) That, as regards exception 4, it was ruled in *R.* v. *Barrow* (L. R. 1 C. C. R., p. 156), that this is not rape by English law. Since then, however, it has been enacted that a man who "induces a married woman to permit him to have connection with her by personating her husband" is guilty of rape (*Criminal Law Amendment Act*, 48 & 49 Vict. c. 69, *s.* 4).

Case.—**Conviction for rape** where consent was given under misconception of fact. From Tidy's *Leg. Med.*, II. p. 244; *R.* v. *Hattery*, L. R. 2 Q. B. D., p. 140.—"The prisoner, a quack-doctor, professed to give medical and surgical advice for money. The prosecutrix, a girl of nineteen, consulted him with respect to an illness from which she was suffering. He advised that a surgical operation should be performed, and under the pretence of performing it had carnal connection with the prosecutrix. She submitted to what was done, not with any intention that he would have carnal connection with her, but under the belief that he was merely treating her medically, and performing a surgical operation, that belief being wilfully and fraudulently induced by the prisoner. The Court were unanimously of opinion that these facts constituted the crime of rape."

Cases of females compelling young boys to have intercourse with them are recorded by Chevers and Powell as having occurred in India, in which young boys had, under compulsion, intercourse with their *ayahs* or other females. Cases of this description, however, do not come under the definition of 'rape' laid down in the Indian Penal Code.

Under the penal code of France, it is an offence for a woman to attempt sexual intercourse, with or without consent, with a boy under the age of eleven.

Age of Victim.—Young children are more frequently raped than adult women, as they are less capable of offering resistance, and as in India the practice of infant marriage creates a desire for intercourse with immature girls. Besides an occasional motive for the rape is the old-world superstition, common both to India and Europe, that intercourse with a virgin is a cure for venereal disease, and the younger the girl the greater the probability of her being a virgin. The child-wives of India are still, to a large extent, the victims of rape

[1] L. R., 1 C. C. R., p. 39; Tidy, *Leg. Med.*, II. p. 194.

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at the instance of their maturer husbands, notwithstanding the Act of 1891, which raised the nubile age from ten to twelve years. For there is reason to believe that premenstrual congress with children is still largely practised in this country under the cover of marriage.

The age: in 205 cases of proved rape in Bengal during the three years 1871–73 there was one 2 years old, one $2\frac{1}{2}$, one 3, three 4, five 5, nine 6, nine 7, eighteen 8, twenty-one 9, twenty-six 10, nineteen 11, twenty 12, thirty between 12 and 15, and only nineteen above 15. That is to say, 51 per cent. were under 10 and 89 per cent. under 15 years of age. In the year 1868 of 48 cases in Bengal in two the age was 5, in seventeen between 6 and 10, in ten between 11 and 15, in seven between 16 and 20, in three above 20, and in nine not stated—that is to say, about half of the victims were under 10 years of age, and in most of the cases the children were badly hurt.

Questions in Rape Cases.

1. **Can a man unaided** commit a rape on an adult female of ordinary strength, in full possession of her senses?—It has been alleged that this is impossible. That, however, in exceptional cases, rape may be committed under the circumstances stated, is shown by the case below, reported by Casper, who, in regard to it, remarks: "The interest of this important case cannot be mistaken, for it shows that a healthy, powerful woman was certainly completely violated by a single man."[1] Ogston also, in reference to this question, remarks that the arguments advanced against the possibility of intercourse under the circumstances stated, "apply rather to the case of entire penetration of the vulva, than to the partial entry, which is now admitted in law as amounting to the crime of rape. That such entry may be forced in an ordinary case, I had the assurance of actual fact in at least one serious case."[2] Chevers, again, gives two cases in which rape was effected by unaided single men on adult females. Of course, the younger and weaker the female, and the stronger the man, the greater the probability of the commission of the offence being possible; *Case* p. 301 illustrates this. A very old woman also may be incapable of offering sufficient resistance. Chevers mentions a case in which a man committed a rape on a woman of seventy.

Case.—**Rape by one man unaided** on an adult female (from Casper's *Handbook*, Vol. III. p. 311).—"L. persuaded F., a girl aged twenty-five, to accompany him to the Tiergarten in the dark, and after he had been baulked by her struggles in his endeavours to violate her against a tree, he seized her round the body and flung her on the ground, and being now, as she states, deprived of the power of resistance, he flung her dress over her head and violated her. Nine days subsequently I had to

[1] Casper, III. p. 311. [2] *Lect. Med. Jur.*, p. 120.

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examine her. She was deeply moved by what had befallen her. The entrance to the vagina was still reddened, and painful when touched and dilated; the hymen was completely torn, and bright red; carunculæ, still slightly swollen, were visible; the frænulum still existed. Without any leading question, and only in answer to general queries as to her bodily and mental condition, she declared that still a little, and several days ago much more, she could only with difficulty walk and pass urine and fæces. After carefully considering all that required to be considered in such a case, I came to the conclusion that a rape had actually been committed upon F. At the time of the trial, circumstances came out which only served to confirm this opinion. The police-officers who had hurried up at the cries of F. testified that the ground upon which she had been thrown was hard frozen, and they deposed that L., when arrested, and after his lust had been satisfied, was still in a condition of actual satyriasis."

Case.—**Rape by one man unaided** on a married girl *æt.* sixteen.—Fadil Gazee, of Jessore, a tall and powerful man, seeing a married girl of sixteen standing at her door, accosted her, apparently under the pretence of asking for a *soot nullee*, and wished to worm out of her if she was alone; finding that she was, he put his arms round her, forcibly drew her into the house, flung her down, and, gagging her mouth with her right hand, effected a criminal connection with her. Before her mouth was well gagged she managed to yell out for assistance, and her cries brought her mother and a neighbour, who found him in the act. He then got up hastily, offered to give her a rupee if she would say nothing more of the matter, and ran off.—Chevers, *Med. Jur.*, p. 702.

2. **Can a woman during sleep be violated** without her knowledge?—A woman can undoubtedly be violated without her knowledge while **under the influence of narcotics** (anæsthetics, also alcohol), or during syncope or coma; and it has been alleged, with reasonable possibility, during **mesmeric trance** (see *Case* below). It is probable also that, in exceptional cases, a woman accustomed to sexual intercourse may be violated during profound natural sleep. Guy, in support of this view, mentions the case of a woman who, in illustration of a symptom which somewhat alarmed her—viz. that her sleep was unnaturally heavy—told him that her husband had assured her that he had frequently had connection with her during sleep.[1] On the other hand, it is highly improbable that a virgin could, during natural sleep, be violated without her knowledge, or even that, without her knowledge, sexual intercourse sufficient to constitute rape could be effected with her. Cases are reported where it is alleged that this has occurred (see *Cases* below); but it may be: "Non omnes dormiunt qui clausos habent oculos!"

Case.—**Alleged violation during mesmeric trance.**—"A girl (*æt.* eighteen) consulted a therapeutic magnetizer as to her health. She visited him daily for some days. Four and a half months afterwards she discovered that she was pregnant, and made a complaint to the authorities

[1] *For. Med.*, 4th ed., p. 57.

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against the magnetizer. They directed a physician and surgeon to determine the date of her pregnancy, and whether complainant might have then been violated and rendered pregnant contrary to her will, *i.e.* if her volition could have been completely or partially annihilated by magnetism. The medical inspectors were satisfied that the pregnancy did not extend further back than four and a half months; and founding their opinion on M. Husson's report, made to the Academy in 1831, concluded that, as a person in magnetic sleep is insensible to every kind of torture, sexual intercourse might then take place with a young woman without the participation of her will, and without her being conscious of the act, and consequently without her being able to resist the act consummated on her. This opinion was confirmed by that of Devergie (*Gazette Médicale de Paris*, and *Edin. Month. Jour.*, December, 1860, p. 566).

Case.—**Alleged violation** during profound natural sleep.—A servant woman at an hotel in Nenagh proved pregnant, and solemnly declared that she was not conscious of having had intercourse with any man. Suspicion, however, fell upon an ostler in the establishment, who subsequently acknowledged that he believed he was the father of the child; that, having found the woman in a deep sleep from fatigue, caused by long-continued exertion and being kept out of bed two or three nights in succession, he had connection with her, and, as he believed, totally without her knowledge, as she did not evince the slightest consciousness of the act at the time, or recollection of its occurrence afterwards. The parties were married with mutual consent.—Ogston, *Med. Jur. Lect.*, p. 121.

Case.—**Another case.**—Casper met with a solitary case in which a girl, *æt.* sixteen, accused a man of having had intercourse with her while she was sleeping in her bed, of which she was not conscious, until he was in the act of withdrawing from her. On her own statement she was *virgo intacta* up to the date of this occurrence. Upon the facts of the case Casper came to the conclusion that, if her statement was true, the man could not have had intercourse with her without causing pain and rousing her to a consciousness of her position. The hymen was not destroyed, but presented lacerations in two places. This and other facts showed that there had been intercourse, but this did not prove that this had taken place without the consciousness of the woman.—Taylor, *Med. Jur.*, II. p. 445.

3. **May pregnancy follow rape?**—It was formerly alleged that pregnancy never followed rape, and that hence if a woman charged a man with committing a rape upon her, and became pregnant as a result thereof, the charge must be untrue, and the woman must have consented to the intercourse. Impregnation is, however, independent of volition on the part of the female, and hence pregnancy, as is proved by more than one recorded case, may undoubtedly follow rape.

4. **May rape cause death?**—The introduction of the mature male organ into the vagina of an immature female may produce local injury sufficient to cause death from hæmorrhage, shock, or subsequent inflammation, such as peritonitis or gangrene, by violent laceration of vagina or perinæum. Such a cause of death was not uncommon amongst the child-wives in

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Bengal up till at least 1890, when a notorious case (see below) attracted medical notice, and led to the Act raising the nubile age from ten to twelve. Even now cases of this kind doubtless happen not unfrequently and are concealed, the death being attributed to other causes. Chevers mentions 14 cases of death from this cause; and Harvey [1] records that in Bengal, in the three years ending 1873, out of the 205 cases of rape which were proved, in 24 of these laceration of the vagina, generally of the posterior wall, was found; and in 14 the perinæum was torn, the rent varying from one-fifth of an inch to one inch in length. Five of these cases terminated fatally (see also *Case* below). Injury to the genitals of a young female may, however, be caused in order to support a false charge (see *Case*, p. 309). Violent sexual intercourse in a young female at or near the age of puberty, may cause constitutional disturbance, leading to fatal hæmorrhage into the brain, peritoneal cavity, etc. On the question whether death may result from nervous exhaustion, the result of repeated intercourse, Chevers cites the case of certain Marquesan women, who boasted, apparently with truth, of having had intercourse with one hundred men in one night. The intercourse, however, was voluntary; had it been otherwise, no doubt the exhaustion would have been greater.

Case.—**Rupture of Vagina** in girl-wife by sexual intercourse.—In 1890 at the Calcutta High Court a fully developed Bengali, aged 35, was charged with causing the death as above of his child-wife, a girl aged 11 years and 3½ months. Medical evidence testified that the girl, although well developed for her age, was immature, had not attained puberty, and was wholly unfit for sexual intercourse. The injury inflicted was a rent of the vaginal wall on the right side of the *os uteri*, measuring 1¾ inch in length and 1 inch in breadth. Copious hæmorrhage took place immediately after intercourse. The girl died of exhaustion 13½ hours after the act. The vagina was found to be distended with a clot measuring 3 inches in length by 1½ inch in breadth, and there was a globular hæmatoma in the right broad ligament, measuring 3 inches in diameter. The mucous surfaces and internal organs were exsanguine; the uterus was infantile, and ovaries showed no sign of active ovulation. There was no sign of injury of the labia or vulva, and no trace of hymen. These circumstances were held to indicate that sexual intercourse, more or less complete, had taken place on previous occasions. The wall of the vagina was thin and showed no *rugæ*. The evidence in this case clearly established the fact that the fatal injury was caused by the sexual intercourse of this mature male with an immature female, his wife. The court held that when a girl is a wife and above the age of consent (which at that time was only ten years), although it is therefore not rape, still the husband has not the absolute right to enjoy the person of his wife without regard to her safety. Found that the prisoner caused the death of the girl by a rash and negligent act.—*Queen Empress* v. *Hurry Mohun Mythee*, I. L. R., 18 Cal. 49; J. Wilson, July, 1890.

[1] *Bengal Med. Leg. Rep.*, 1870–72, pp. 179 *et seq.*

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Case.—**Death following rape.**—Rape on a female *æt.* nine. Death from hæmorrhage from a wound on the genitals ascribed to the introduction of the male organ. The left wall of the vagina was ruptured from the orifice upwards for $2\frac{1}{2}$ inches, and the rent was an inch wide.—*Ind. Med. Gaz.*, November, 1875.

On the other hand, it has been held to be physically impossible that a girl of tender age should be killed by any violence in rape, and not show external signs of violence (*Queen* v. *Banee M. Mookerjee*, 1 W. R. 29, November 22, 1864).

Rape on the dead.—It is necessary to find in such cases whether the female died from assault combined with rape, or was violated afterwards. The direction of the flow of blood will give indications. In cases of young children it is probable that rape was first committed and murder afterwards. In older females it is probable that they were murdered first and violated afterwards.

Cases.—**Rape on Dead.**—(*a*) *R.* v. *Kerr.* Charged with rape on woman whose death was not from injuries produced, but from suffocation by vomited matter entering larynx by the violence offered. Locally there were two lacerations in vagina in addition to excoriation of abdomen and blood on the external genitals. The most conclusive *circumstantial evidence was the knees of the prisoner's trousers* were soiled with mud corresponding to that of the place where the assault was committed, and adherent to them was some red-coloured woollen fibre resembling that of the fabric of the woman's petticoat. Although prisoner averred that the woman consented he was found guilty.—Carlisle Summer Assizes, 1889.

(*b*) **St. Ayr Case.**—Female killed first and raped afterwards.—Sir Jas. Stephens, *Crim. Law of England*, 345 f.

(*c*) **Léotade Case.**—The body of the girl bore marks of a violent attempt at rape which was unsuccessful because the girl was not mature. In addition was violence to her head by a broad, blunt instrument.—*Id.*, 318 f.

(*d*) **Rape with Murder.**—A lad of Benares, who stated himself to be eighteen, but who appeared to be fourteen or fifteen years old, confessed at the *thannah* and magistrate's court that he had carnal knowledge of a child of seven, had caused her death in so doing, and had stolen her ornaments. The body was found concealed in a room, much decomposed, with a stone on the chest, and a cloth wrapped round the neck. Dr. Leckie, on removing the cloth, found that the whole of the soft parts of the neck had been destroyed, from which he inferred that it had been compressed, and that strangulation was the probable cause of the death. —*Niz. Ad. Reports, N. W. P.*, June, 1853.

EXAMINATION IN RAPE CASES.

As neither the complainant nor accused can be compelled by a magistrate or any one else to submit to being examined

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(without being guilty of and running the risk of a charge for indecent assault), the medical man must invariably, and in the presence of witnesses, obtain the *consent* of the person in question to make his examination, and at the same time caution the persons that the results of the examination may be used as evidence against them. Where the victim is under age, the consent of the nearest guardian should be asked. If a woman refuses to be examined it is probable that no rape has been committed.

The examination will comprise: (1) Examination of the victim or complainant, (2) The accused, and (3) Stained linen worn by the parties at the time, and (4) The spot where alleged crime was committed.

Examination of the Victim.

Having obtained her consent, and in the presence of a third person in order to avoid false charges being brought against you, commence in a good light, to make your examination; after note down in writing the following points [1] :—

Preliminary Examination :—

1. Date and exact hour at which she visits you.	1. With reference to lapse of time since alleged rape. If long delayed, why ? as traces may disappear in 3 or 4 days.
2. Her walk and mental state.	2. Referring to pain, emotional state, alcohol, etc.
3. Who accompanies her, and their attitude towards accused.	3. Referring to concocted tales.
4. Her Statements.	
(1) Age.	
(2) Date, time and place of alleged offence.	
(3) Exact position of parties, sitting, standing, etc.	
(4) Did she cry out or struggle ?	4. Screaming out does not necessarily imply want of consent when it is done only when discovered by a third party in a compromising position.
(5) Was she sensible the whole time ?	
(6) Menstruating or not.	

Examination of her clothes.—Then let her be undressed in such sections as are required, by some other person, and note if stains of blood, semen, mud, etc., are on her clothes. The clothes may be found torn or stained with blood, and

[1] Modified after F. T. Smith, *Med. Jur.*, 192.

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marks of blood may be found on the person. Of course, in such a case, the question will arise whether the blood is menstrual or not. As already pointed out, stains of menstrual blood cannot be distinguished from stains of other blood; by inquiry, however, it will have been ascertained whether or not the female was menstruating at the time of the alleged commission of the offence. If the female is seen soon after the alleged rape, the discharge from the vagina, if a discharge exists, or the vaginal mucus, should be examined for the presence of spermatozoa (see below). Spermatozoa may even be found in the vaginal mucus ten to fourteen days after rape. Stains containing spermatozoa may be found on the clothes; but it must always be recollected that the non-discovery of spermatozoa does not prove the absence of semen.

Seminal Stains.

The examination for seminal stains is made in connection with cases of rape and unnatural crime, though in neither of these is the detection of semen essential to the proving of the crime, for the actual emission of semen is not necessary for legal conviction.

Characters of the seminal stain :—(1) Semen stiffens cloth like starch, and is of a light greyish-yellow colour; pus and several other discharges stiffen cloth in a somewhat similar manner. (2) The characteristic odour may be given out on moistening the stain, if the cloth is otherwise sufficiently clean. (3) Presence of spermatozoa. This is the only positive and trustworthy test for semen, but it is essential that one or more should be seen in a complete form, with filament attached.

Mode of examination.—If taken direct from the vaginal mucus, a drop of the latter is placed on a slide and covered with a thin cover-glass and examined with a power of 300 to 400 diameters. If dried, as upon a garment or hair, the examination is more difficult, see below, also Hankin's method in Appendix IX., which is specially adapted for tropical conditions.

If the semen has dried on a fabric or on hair (the part of female underclothing most likely to contain semen are the back and front of inner garment over the genitals), the spermatozoa require to be softened and carefully separated without breaking from the material to which they have been glued down by the drying of their albuminous fluid. For this, the stain should be handled as little as possible and kept flat during the softening. A weak solution of hydrochloric acid, one drop to 44 c.c. (as recommended by Ungar), is the best softening solution to

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avoid undue swelling. A few drops of this solution is put into a watch-glass with a fragment of the stained cloth, which latter is so placed that its lower end dips into the fluid and is allowed to soak for a few minutes to several hours, according to the age of the stain. When the softening is complete, the fragment of cloth is removed by forceps and gently dabbed on the slide to shake out the spermatozoa, the mark or deposit thus obtained is covered with a cover-glass and examined microscopically. As the spermatozoa are very translucent they may be made more apparent by being stained. The simplest way of doing this is in the moist way, combining the staining and softening solutions in one. A solution of methyl green 0·15 to 0·3 grain in 100 c.c. of water to which 3 to 6 drops of hydrochloric acid is added, is to be used as above described, but the fabric must steep in it for several hours. By the dry method double staining of the deposit may be made by eosin and logwood (Friedänder's) or by eosin and methyl green, whereby at the base of the head of the spermatozoon is a hemispherical portion which stains green while the anterior part and tail stain red.

Characters of Spermatozoa.—These are minute bodies with an oval or pear-shaped transparent head (which strongly refracts light posteriorly) and a long slender tail. Human spermatozoa have a flattened, almost oval head, and vary in length from $\frac{1}{1000}$ to $\frac{1}{500}$ of an inch, the head being about $\frac{1}{9000}$ of an inch in diameter (see *Plate IV.*, Fig. *a*). It is not easy to recover spermatozoa from stains on cloth even from spots of undoubted semen. Careful search should be made in several specimens of the deposit. For sometimes the seminal fluid contains numerous spermatozoa, at other times only a few, and frequently they are at times absent from the seminal fluid, even of young healthy men. Hence, while the discovery of spermatozoa in a stain is positive evidence of its seminal origin, their non-discovery does not enable you to swear that the stain is not semen. When a seminal stain is mixed with much blood or the clothes are very dirty, the detection of semen is especially difficult. Monad animalcules and threads of fibrin or broken pus nuclei in the stain-preparations must not be mistaken for spermatozoa.

Characters of Vaginal Monad Animalcules.

Powell has found Trichomonas vaginalis in about one-third of the rape cases brought for medico-legal examination, when there is sufficient vaginal secretion to make a moist cover-glass preparation. He has kindly contributed the following important note of his methods.

"The animal is pear-shaped (see Fig. 2, *Plate IV.*), about two to three times the diameter of a red blood-corpuscle (16 to 20μ). Its power of locomotion under a cover-glass is small, but its rotatory movement and the lashing of its flagella are so active that it is extremely difficult to count the latter. If the light from the condenser be partially shut off the presence of the animal is readily detected by the commotion of the neighbouring pus-cells caused by the lashing flagella. At the pointed end of the pear-shaped body is a short, stiff rod. At the opposite end are three flagella, sometimes a flagellum trails backward along the edge of the undulant membrane. *There are no cilia as described by*

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Donné and figured in Taylor's, Dixon Mann's and other text-books. Sometimes a small notch or a kink in the undulant membrane may be seen close to the flagella. In this notch or mouth a particle of dirt or debris may lodge and give rise to the impression of cilia. The body is granular, of the same colour as the pus-cells, possesses a nucleus and sometimes a vacuale-like spot. Though fairly expert in the technique of fixing and staining Flagellates, I have never succeeded in staining one of these parasites. In a few cases I have found in the vagina a smaller monad 7–10μ in diameter with only two flagella. The size of these monads, their granular appearance, the number of their flagella, the difficulty in staining, and the fact that they break up and are unrecognizable in dry smears must prevent any one mistaking them for spermatozoa."

Examination of her person.—Note her physical development, with reference to power of struggling, etc., and any bruises or scratches with reference to possibility of self-infliction.

Scratches, finger-marks, bruises, or wounds, may be found on parts of the body other than the genitals, and the more the resistance offered the more likely are such marks to be found. Hence, therefore, such marks are likely to be more numerous if the subject is an adult female, and less numerous if a child. Even, however, in the case of an adult female, a rape may have been committed, and no such marks may be found. This may happen if the offence was committed while the female was insensible, or if several persons combined in the assault, some holding the female; or even where one man only has been concerned in committing the offence, when the woman has been nearly suffocated by her clothes being thrown over her head. Marks of violence employed to prevent the female crying out, may be found on the mouth or throat.

Sometimes violence employed for this purpose results in death from suffocation. Thus Chevers mentions a case where the husband of a young girl, in order to stifle her cries during first connection, bound a cloth over her mouth, and after intercourse found her to be dead.[1] In a case which came before the Bombay Chemical Analyzer's office, it was reported that "deceased had been violated before death, and that the cause of death was suffocation, produced by the forcible introduction of earth into the mouth and windpipe.[2]

Then examine the genitalia for signs of loss of virginity and other injury or disease; noticing first the hairs on pubes, whether matted or stained, cutting off a portion of any such for microscopic examination; also whether any bruising, redness, or swelling of the *vulva* and any discharge from the *vagina*.

1. **Signs of loss of virginity.**—These are obviously only available as evidence of rape in cases where the female was *virgo intacta* previous to the commission of the offence. The hymen: as this is the most reliable sign of virginity, so rupture or laceration of this membrane is the chief sign of defloration

[1] *Med. Jur.*, p. 695. [2] Tidy, *Leg. Med.*, II. p. 200.

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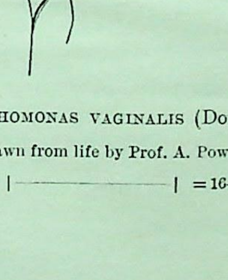
PLATE V.

a



HUMAN SPERMATOZOA × 900.

b



TRICHOMONAS VAGINALIS (Donné).

(Drawn from life by Prof. A. Powell.)

Scale |————————| = 16—22 *m*

[*To face p.* 308.

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available as evidence of rape, the various other signs of virginity being, as a rule, not lost as a consequence of one intercourse. Recent lacerations of the hymen are "sharp-edged, fresh-looking, and tender"[1]; and when rupture of the hymen has recently occurred, the carunculæ myrtiformes are found swollen and tender; also in recent defloration, especially if due to rape, a hot and tender condition of the genitals, accompanied by pain in walking, and pain and difficulty in passing urine and fæces, perhaps lasting some days, may be present. There may or may not be laceration of the fourchette.

Laceration or rupture of the hymen may, however, occur independently of sexual intercourse, viz. from the introduction of foreign bodies other than the penis. Rape, again, even in females over the age of puberty, may be unaccompanied by injury to the hymen; and, as already pointed out, in very young children the hymen is not usually even lacerated by sexual intercourse. On the whole, therefore, the presence of signs of recent injury to the hymen is to a certain extent evidence, but by no means conclusive evidence, in support of a charge of rape. The evidence, however, in favour of rape becomes stronger in proportion as the signs of local and other injury are greater. On the other hand, especially in young children, the absence of injury to the hymen cannot be taken as negativing the supposition that rape has been committed.

2. **Other injury to the genitals.**—Rape by an adult on an immature female usually causes a considerable amount of local injury. The injury may amount simply to bruising, but frequently laceration of the parts results, and these lacerations may be extensive and severe enough to cause death. Severe injuries may be followed by inflammation and sloughing of the parts. Again, injuries to the genitals of immature females resembling those resulting from rape, have been caused by the introduction of foreign bodies other than the penis with the object of rendering them *aptæ viris*, or in order to support false charges (see *Case* below).

Case.—**Injury to the genitals** of a young girl for the purpose of supporting a false accusation.—A procuress brought a girl into the officers' barrack, Fort William, Calcutta, but the person to whom she was presented objected to the girl on account of her youth. The bawd, having been disappointed of her fee, injured the girl so as to cause very considerable hæmorrhage from the genital organs. The girl was seen by an assistant-surgeon in the fort, and the circumstances of the case having been reported to the police, it was discovered to be a conspiracy against the officer to obtain money. The child recovered.—Chevers, *Med. Jur.*, p. 701, from the *Med. Times and Gaz.*, May 21, 1859.

[1] Tidy, *Leg. Med.*, p. 200.

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In females who have reached puberty, laceration of the genitals may be found, if the disproportion between the size of the organs of the parties is great, or if much violence has been used. In adult females accustomed to sexual intercourse, lacerations are not likely to result from rape alone. Cases, however, are reported, where fatal laceration of the genitals has been produced in adult females after violation, by forcing foreign bodies such as sticks into the vagina. Bruises, scratches, and marks of violence, other than those caused by the introduction of the penis, may be found on the genitals, especially in adult females, but may be absent. On the whole, the presence of marks of local injury to the genitals is, to a certain extent, evidence in support of the supposition that rape has been committed. On the other hand—except when the subject is an adult female accustomed to sexual intercourse—the absence of such marks is strong, but not conclusive evidence against the same supposition.

Case.—**Post-mortem appearance of** *noma pudendi* in a girl aged five. —"The genital organs externally, and the skin around and beyond the anus, were intensely inflamed, swollen and ulcerated, and in an approaching state of gangrene or sloughing. The hymen was destroyed posteriorly, and the lining membrane of the vagina and uterus was much inflamed, of a dark purple colour, with softening and disorganization of substance. The upper inguinal glands were enlarged on both sides. The child was in a neglected and dirty state."—Taylor, *Med. Jur.*, II. p. 432.

3. **Signs of infection with disease.**—Many cases of rape by adults on young children owe their origin to a popular belief that sexual connection with a virgin is a cure for venereal disease; and there is no doubt that in this way female children are infected with gonorrhœa, a disease readily communicable to them. Ogston [1] mentions the case of a man who, while affected with gonorrhœa, had connection with four female children, communicating the disease to three of them. Female children, however, may become infected with gonorrhœa without intercourse. A case is recorded in which two girls, *æt.* respectively one and four years, became infected with the disease from using a sponge which had been used by a female suffering from it.[2] It is, however, not easy to distinguish non-syphilitic from syphilitic sores; or a gonorrhœal discharge from a muco-purulent discharge, arising from worms, etc., in dirty or delicate children, but it can be so distinguished (see *Case* below). Adult females are liable to leucorrhœa, which although usually a mucous discharge, may become, like gonorrhœa, muco-purulent owing to ulceration of the vagina. In adult females, also, it must be noted that the existence of syphilitic sores or of

[1] *Lect. Med. Jur.*, p. 96. [2] *Med. Gaz.*, Vol. XLVII. p. 144.

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gonorrhœa, only proves impure connection, not rape. The period of incubation of syphilis, or of gonorrhœa, may have an important bearing in a case of alleged rape. This in gonorrhœa varies from some hours to three or four to twelve days, and in syphilis from fourteen to forty-five or more days. Hence, if a female is seen within a few hours after an alleged rape has been committed, and is found to be suffering from a profuse discharge; or is seen within a few days, and is found to be suffering from syphilis; the presumption is strongly against the disease having been communicated during the intercourse represented as a rape. It should further be noted that infected individuals do not necessarily by intercourse communicate either gonorrhœa or syphilis.

Case.—**False charge of Rape.**—"S., girl of 18, charged three hackney drivers with raping her the previous night. She professed to have been a virgin up to the time of the alleged rape. On examination, I found a profuse and chronic gonorrhœa. The hymen was represented by mere caruncles. None of the three accused then or a week later had any sign of gonorrhœa."—Prof. Powell's *Reports*, 1917.

Cases.—Dr. Powell cites a case (*Ind. Med. Gaz.*, 1902, p. 232) where he knew four men to have connection with a woman suffering from a copious gonorrhœal discharge, and only one was infected, and in another case out of seven troopers only two of them were infected. Mr. Hutchinson estimates that probably not once in a hundred acts of coition with a syphilitic partner is a chancre contracted.

In the case of rape on young children, however, there is greater likelihood of inoculation on the freshly torn surface.

The discharge should be examined microscopically with the requisite stains for the detection of the gonococcus of Neisser.[1]

If the accused be suffering from gonorrhœa, the vagina of the complainant should certainly be searched for spermatozoa and gonorrhœal pus as soon as possible. Here, as recommended by Dr. A. Powell, a douche should be given, and a second examination for pus and gonococci made an hour or two later. If gonococci be now abundant, on the day of the alleged rape, they cannot be due to that act. A third examination should be made at the end of a week. If gonococci or the soft sore be now present, and had existed on the prisoner at the time of the rape, the evidence will be of value.

When examining for gonococci it is well to take two slides. One is stained with methyl blue, the other with aniline violet, and examined in xylol under a cover-glass. If preferred the Gram stained slide may at once be counter-stained with Bismarck Brown, in which case the gonococci will be brown. The position of some diplococci is then noted and marked with a finder, Gram's process is then completed. If the cocci be gonococci they will be decolorized. The civil surgeon in India is not

[1] Doubts have been expressed as to the pathognomic value of the gonococcus. Thus, Morrow (Genito-Urinary Diseases) adduces the cases of six raped girls in which a pseudo gonococcus or diplococcus was found, which was morphologically and bacteriologically identical with the gonococcus of Neisser, but none of them suffered from gonorrhœa.

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likely to have serum culture material at hand, but he may inoculate agar tubes. Should diplococci develop, they cannot be gonococci. In the intertrigo of children, due to dirt, the staphylococci, albus, and aureus are most commonly found. In discharges from the vagina, bacilli of the colon type are common.[1]

Case.—**Gonorrhoeal infection in Sodomy.**—Dr. A. Powell relates[2]—In a case of sodomy I examined the catamite, a boy eight years of age, about an hour after the occurrence. There was a slight recent tear near the anus, which was surrounded by pus. The boy had no ulcer, abscess, or dysentery to account for the pus, which contained gonococci and a remarkably large proportion of eosinophile leucocytes. The accused had gonorrhœa, in the discharge of which there were gonococci and a similar unusual proportion of eosinophiles. The next day the boy had no discharge from the anus. A little clear exudation from the tear showed no unusual character in the leucocytes.

To recapitulate.—To distinguish between a gonorrhœal discharge and a muco-purulent discharge, note (1) profusion of discharge; (2) presence or absence of gonococci, or B. coli communis, thread-worms or their ova; (3) duration; (4) response to cleanliness and treatment—prompt in 'dirt' cases, slow in gonorrhœa; (5) locality—urethra often inflamed in gonorrhœa, seldom in other; (6) co-existence of eczema, often in 'dirt' cases.

4. **The age of the victim** of alleged forcible intercourse may have to be determined, especially as *nearly nine-tenths* of the cases of rape in India are on children, and the question arises whether or not she is under twelve years of age, so as to be capable of giving consent to the act, or if she is under sixteen with reference to abduction of a minor for immoral purposes. In England the question of age would be (*a*) is she under thirteen, or (*b*) under sixteen? The following recent case well illustrates how the examination of an alleged victim of rape should be conducted and reported :—

Case.—**False charge of rape and venereal infection.**—In 1901 a girl, aged 10, and her mother charged a wealthy old man with the rape of the former, and with infecting her with gonorrhœa. She was brought by the police for examination, by Dr. A. Powell, three days after the alleged rape. The child is in a poor condition and very dirty. There are no signs of bruising or injury. There is slight muco-purulent discharge from the vulva and vagina. The hymen is slightly swollen, of normal colour, circular with a mesial oval opening. There is no tear or abrasion. The opening will not admit a $\frac{1}{3}$-inch glass rod without tearing or duly stretching. There is a slight eczema intertrigo in the labio-femoral folds. The thighs are stained with green aniline dye. A pair of drawers, dyed a similar colour, are marked by three stains of a brownish-red colour, which are pointed out as blood-stains due to tearing in the act of intercourse. The stains do not give the reactions of blood. Though dry, they are not stiff. Under the microscope they are seen to contain starch

[1] *Ind. Med. Gaz.*, 1902, p. 232. [2] *Ibid.*

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cells, spiral vessels, and other vegetable structures, as well as numerous ova of the thread-worm. The discharge from the vagina contains no spermatozoa; pus cells are numerous; there are no gonococci, many short bacilli of a colon type, a few staphylococci which all retain the stain after Gram's process. OPINION.—The child has what are usually considered the signs of virginity. I consider it impossible that a body as large as accused's penis could penetrate the hymen without tearing it. The child has a discharge from the private parts, but I am of opinion that it is not venereal in origin, as the germs usually found in gonorrhœa are absent. Similar discharges are said to frequently arise from the irritation of dirt or worms. There is evidence of the presence of numerous eggs of worms. The child is dirty, and has an eruption, such as would be caused by dirt or an irritating chemical such as was found on her thighs and drawers. The stains alleged to be of blood are not blood: they are human fæces. The discharge from the skin and the private parts is a chronic one, and must have existed for some time.—The accused was released.

Examination of the Accused.

This should ascertain:—(1) His age and capacity for committing the offence; (2) whether his clothes or person exhibit signs of recent sexual intercourse or a struggle; (3) whether he is suffering from venereal disease.

Age and potency.—This is ascertained as already described. As regards age whether he is under seven, or under twelve (p. 42), and as regards impotency see p. 261, also his muscular development.

Signs of recent intercourse.—Glans. If this be covered by uniform layer of *smegma*, it negatives the possibility of recent complete penetration. If not, any abrasions should be noted, especially on frænum.

Stains on clothes or person.—The presence of *semen* on the clothes or person of accused is only evidence of recent emission and may have an innocent explanation, or have been in connection with another woman. **The presence of blood is important** if the alleged victim is a child or virgin; but the stains may have been removed by washing before your examination. It is of the utmost importance in rape cases that the police should not allow the accused person to retire to a water-closet on any pretext before the surgeon has made his examination.

Case.—Dr. A. Powell relates[1]:—A menstruating woman accused a neighbour of rape. He was arrested in her room, but allowed by the police to wash himself. On examining him I found no trace of blood on his private parts. He quite frankly admitted intercourse, but with

[1] *Ind. Med. Gaz.*, 1902, 231.

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consent. He stated the woman only cried out when some friends attempted to enter the room. He added that his penis and hand were covered with blood when arrested, and it was for this reason he went to the latrine and washed.

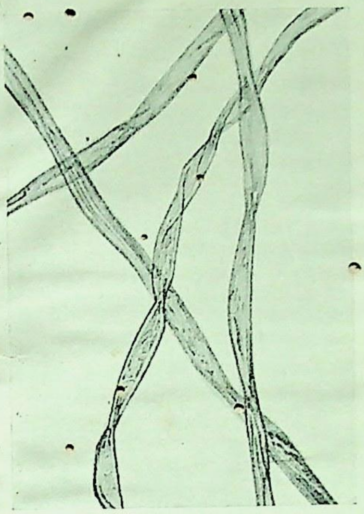
Stains of mud, etc., derived from the spot where offence is alleged to be committed should be looked for. Any **scratches** or bruises on his body should be noted with reference to a struggle.

Signs of venereal disease.—If the accused is suffering from venereal disease his discharge should be at once examined, and the character of the pus and any organisms therein compared with any found then or subsequently on the victim (see *Case*, p. 312), and at the same time the presence in it or absence of spermatozoa can be ascertained.

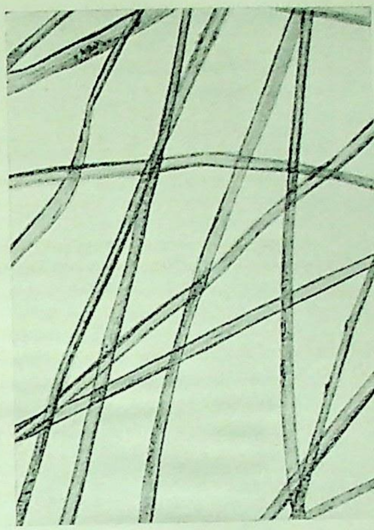
The **Spot** where the offence is alleged to have been committed may show signs of a struggle having taken place, or there may be blood-marks on it, or an impress of the body of the female on the ground.

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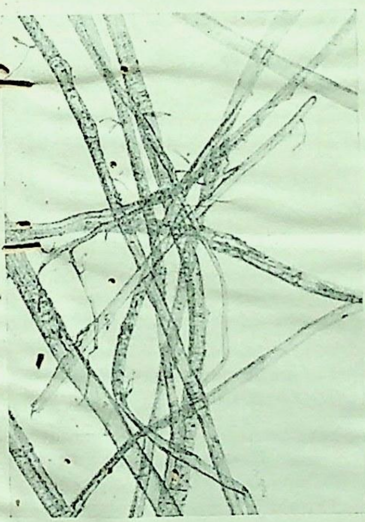
PLATE VI.



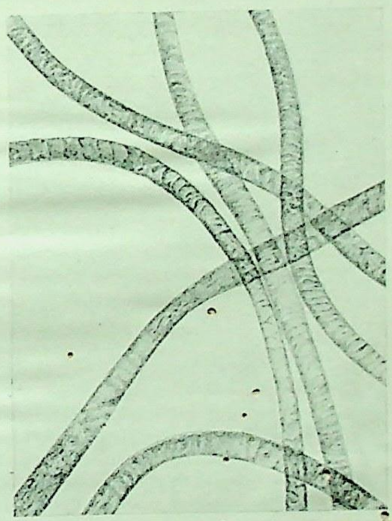
a.—COTTON FIBRE × 130.



b.—SILK FIBRE × 130.



c.—LINEN FIBRE × 130.



d.—SHEEP'S WOOL × 130.

(From Micro-Photographs by Dr. H. Gibbes.)

[*To face p.* 314.

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CHAPTER XV.

CRIMINAL ABORTION OR MISCARRIAGE—FOETICIDE.

Criminal Abortion or **Foeticide** is undoubtedly very prevalent in India, though only a relatively small proportion of the cases come into the law courts, usually those cases only where the results have proved fatal to the mother, as prosecutions are beset by obvious difficulties and convictions are extremely rare. Amongst Europeans in India cases often occur in medical practice where hæmorrhage, paralysis, and other symptoms are obviously due to the clandestine use of abortifacients. On the frequency of this dangerous and immoral practice amongst Europeans in India an experienced Anglo-Indian physician writes:—"I am afraid that in India inducements to procuring abortion criminally are frequent and strong, and I have known instances in which solicitations in that direction have caused medical men to swerve from the path of rectitude; but apart from considerations of personal reputation and professional honour, the blunt truth should never be forgotten that fœticide is murder, and, if fatal to the unfortunate mother, double murder."

Criminal abortion or 'causing miscarriage' is unlawful expulsion of the fœtus. The term **'miscarriage,'** as used in law, includes both abortion and premature labour. Medical writers, however, restrict the term 'premature labour' to denote premature expulsion of a child that has attained viability, and use the term 'abortion' or 'miscarriage' to signify expulsion of an ovum or fœtus at an earlier period.

Miscarriage may be—(1) Accidental, *i.e.* the result of natural or accidental causes; (2) Justifiable, *i.e.* the result of a lawful act; or (3) Criminal, *i.e.* the result of an unlawful act.

Accidental Miscarriage.

This frequently occurs, and is more common in the earlier than in the later stages of pregnancy. Whitehead, from

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observation of 2000 pregnancies, estimates that one in seven end in abortion. Dr. Robert Barnes divides the causes of accidental or natural miscarriage into (1) Maternal, and (2) Fœtal causes, and classifies them thus:—

Maternal causes.—(1) Poisons circulating in the mother's blood: (*a*) introduced from without, as fevers, syphilis, various gases, lead, copper, etc.; (*b*) products of morbid action, as jaundice, albuminuria, carbonic acid from asphyxia, and in the moribund. (2) Diseases impoverishing the blood, *e.g.* anæmia, obstinate vomiting, over-lactation. (3) Circulatory disturbance, *e.g.* liver, heart, and lung disease. (4) Nervous troubles: (*a*) certain nervous diseases, as chorea, etc.; (*b*) mental shock; (*c*) diversion or exhaustion of nerve force, as from obstinate vomiting. (5) Local diseases: (*a*) uterine diseases, as fibroid tumours, inflammation, hypertrophy, etc., of the uterine mucous membrane; (*b*) mechanical anomalies, as retroversion, pressure of tumours external to uterus, etc. (6) Artificially induced abortion.

Foetal causes.—(1) Diseases of the membranes of the ovum, *e.g.* fatty degeneration, hydatidiform degeneration, inflammation, congestion, apoplexy, and fibrous deposits. (2) Also diseases of embryo itself.—Malformation, inflammation of serous membranes, diseases of nervous system, diseases of kidneys, liver, etc., and mechanical, as from torsion of the cord.

Common causes of accidental miscarriage are syphilis, mental shock, and accidental violence. In some women miscarriage results from the slightest exciting cause. Others having once miscarried, miscarry in subsequent pregnancies apparently without any exciting cause. Others, again, seem "proof against the more severe physical injuries and suffering and the most violent mental excitement." [1]

Case.—**Failure of external violence** to cause miscarriage.—In the Assize Court of the Loire-Inférieure it was proved that a peasant who had seduced his servant and wished to make her abort, mounted on a strong horse, and put the girl on the same horse, then galloped wildly hither and thither, throwing her down on the ground whilst in full gallop, and this repeatedly. Having tried this twice without success, he applied to her stomach bread just taken from a very hot oven. This means failed like the former, and the poor victim gave birth to a living and well-formed child at term.—Woodman and Tidy, *For. Med.*, p. 754, from Tardieu.

Case.—**Failure of violence** to cause miscarriage.—A young woman seven months with child had employed savin and other drugs to produce miscarriage. As these failed, her paramour bound a strong leather strap tightly round her body. This, too, availing nothing, he (by his own confession) knelt upon her with all his weight, and trampled on her while she lay on her back. As this also failed, he took a sharp-pointed pair of scissors and proceeded to perforate the uterus through the vagina. Much pain and hæmorrhage ensued, but did not last long. The woman's health did not suffer in the least, and pretty much about the regular time a living child was brought into the world, without any marks of external injury upon it.—Guy, *For. Med.*, p. 87, quoting Dr. Wagner, of Berlin.

[1] Tidy, *Leg. Med.*, II. p. 156.

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Justifiable Miscarriage.

In defining the offence of causing miscarriage, *s.* 312 of the *I. P. Code* excepts as not criminal miscarriage caused "in good faith and for the purpose of saving the life of the woman." The law of England does not formally define under what circumstances it is lawful to cause miscarriage. Usually justifiable miscarriage takes the form of "artificial induction of premature labour," *i.e.* the operation is deferred until the child has attained viability, so that, if possible, its life as well as that of the mother may be saved. So long, however, as the operation is undertaken for the purpose of saving the life of the mother, miscarriage may be legally caused at any period of pregnancy. For the purpose of saving the mother's life it may be necessary to cause premature expulsion of the contents of the pregnant uterus in the following cases:—

(1) Pelvic distortion where the antero-posterior diameter of the pelvis (normally 4¼ inches at the brim and 4⅗ inches in the cavity) is reduced below, or to, 3¼ inches. (2) Obstruction by the presence of tumours or contractions of the soft parts arising from cicatrices, of such a nature as to prevent the passage of a mature child. (3) Where during gestation the mother's life is endangered by obstinate vomiting, hæmorrhage from placenta prævia, convulsions, or serious cardiac, or pulmonary, or other disease. Dr. Meadows and others advise the artificial induction of premature labour in "cases in which there is evidence that on several previous occasions the death of the fœtus occurred at a given time suddenly. Here," writes Meadows, "the operation would be resorted to prior to the period in question with the view of preventing its recurrence."[1] To cause miscarriage under these circumstances is by the law of India not justifiable, unless there is reason to believe that the child's death will endanger the life of the mother.

Criminal Miscarriage.

Criminal abortion, or miscarriage, common in many countries, is especially common in India. It is resorted to by both single and married women in order to get rid of the product of illicit intercourse or to avoid inconvenient additions to their families. In India the custom of preventing the remarriage of widows tends directly to increase the prevalence of the offence. In India, in fact, in by far the great majority of cases of this offence, the female who has miscarried is a Hindu widow (see *Cases* (*a*), (*b*), pp. 275–6) who resorts to this practice to avoid disgrace. This, however, is not invariably the case (see *Case* (*d*), p. 276). This crime is also not uncommonly practised by European women in India, as already noted.

[1] *Man. of Midwifery*, p. 234.

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The sections of the *Indian Penal Code* concerning the offence of causing miscarriage are as follows :—

312. "Whoever voluntarily causes a woman with child to miscarry, shall if such miscarriage be not caused in good faith for the purpose of saving the life of the woman, be punished with imprisonment of either description for a term which may extend to three years, or with fine, or with both; and if the woman be quick with child, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine." "Explanation.—A woman who causes herself to miscarry is within the meaning of this section."

313. "Whoever commits the offence defined in the last preceding section without the consent of the woman, whether the woman is quick with child or not, shall be punished with transportation for life, or with imprisonment of either description which may extend to ten years, and shall also be liable to fine."

314. "Whoever with intent to cause the miscarriage of a woman with child, does any act which causes the death of such woman, shall be punished with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine; and if the act is done without the consent of the woman, shall be punished either with transportation for life, or with the punishment above mentioned." "Explanation. —It is not essential to this offence that the offender should know that the act is likely to cause death." [Unlike in English Law the question here arises of the consent of the woman.] Two other sections of the Code refer to results which may arise to the child from the doing of certain acts before its birth, namely, *s.* 315; and

316. "Whoever does any act under such circumstances that, if he thereby caused death, he would be guilty of culpable homicide, and does by such act cause the death of a quick unborn child, shall be punished with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine."

Attempts to cause miscarriage may be dealt with either by the application of the provisions of *s.* 511 of the Penal Code to *ss.* 312 or 313; or if the attempt has been made by the administration of an "unwholesome drug or other thing" the case may be dealt with under *s.* 328. Hence by the law of India to voluntarily cause or attempt to cause 'miscarriage,'

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